

## ARCHIVES OF OTOLOGY.

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### ACUTE PURULENT OTITIS AND MASTOIDITIS, TREATED BY MEANS OF ARTIFICIALLY IN- DUCED HYPERÆMIA, ACCORDING TO THE METHOD OF BIER, WITH REPORT OF CASES.<sup>1</sup>

By S. J. KOPETZKY, M.D.,

ASST. SURGEON TO THE EAR DEPARTMENT OF THE MANHATTAN EYE, EAR, AND THROAT  
HOSPITAL, NEW YORK.

*Historical.*—In 1903, Prof. Bier, of Bonn, published his work on the Therapeutics of Hyperæmia (*Die Hyperaemia als Heilmittel*, Leipsic, 1903), advocating a method for treating acute inflammatory and suppurating conditions in the human body which in principle stands in contradistinction to all other. Its action, undefined by him, depends upon heightening the inflammatory reaction rather than subduing it, thus attempting to aid nature to withstand the invasion of the body by the deleterious agents of disease. In 1905, he reported upon 110 cases of pronounced acute and subacute suppuration, wherein pus was evidenced by exploratory puncture, incision, or discharge from existing wounds or fistulæ, which were all treated by this method with varying degrees of success (*Muench. med. Woch.*, 1905-1907).

The cases consisted of suppurating abscesses, "pus joints," and purulent phlegmons. From his observations he concluded that by means of induced hyperæmia a method of treatment was provided in beginning suppurative processes,

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which brought about results such as no other therapeutic agent heretofore had demonstrated, besides prominently advancing the possibility of avoiding grave and dangerous operations.

At the German Surgical Congress of 1905, Bier again demonstrated induced hyperæmia. Incidental to this demonstration, he reported that he had treated 18 cases of otitis media purulenta, of which 12 were cured at once, and the rest, failing to react, required operation. Cholesteatoma and sequestra were found at operation in these latter cases. He attributed his failure to effect cures to these findings and therefore considered these cases unsuitable for the exhibition of his method. Later his otological cases were reported upon at length by Keppler.

Meanwhile, prior to Keppler's publication, Heine tried the method at Lucae's clinic in Berlin, and made a report to the German Otological Society in June, 1905, on nineteen cases. (*Verhandlungen der deutschen otologischen Gesellschaft*, June, 1905.) Strictly following Bier's directions for inducing hyperæmia of the head, Heine applied the method to his ear cases.

In August, 1905, Keppler's reports were published. (*Zeitschrift für Ohrenheilkunde*, Bd. 50, translated and published in this number of these ARCHIVES.)

To complete the historical review of the method, it is necessary to call attention to the discussions which followed the reading of the above-mentioned reports. Thus we find that Voss, Heinsberg, Vohsen, Eschweiler, Kobrak, and others reported verbally varying degrees of success, but the material reported upon is in such shape that its scientific study is rendered impossible, because of the absence of detailed histories, and I have perforce been compelled to disregard these verbal reports.

*Summary of Reports.*—Summarizing these results, we find that among the twenty-one cases reported by Keppler—these including Bier's cases—eleven were acute otitis media evidencing positive mastoid involvement. These all healed in from two to four weeks without resort to the indicated operative procedures. Of the chronic cases, two healed without

operations; one other was cured after the removal of a polyp, and another after an incision had been made over the mastoid process. His other chronic cases did not react to the hyperæmic treatment and required operation.

Heine reported that he had employed the method in nineteen cases, among which there were four double involvements—that is, on twenty-three diseased ears. His results were as follows: In cases classified as otitis media acuta both with and without mastoiditis, cures were obtained without operative measures other than the performance of a paracentesis seven times in fifteen cases, the cure being complete in from six to ten days. One of these cured cases recurred after twenty-four days and demanded operative measures. Among his negative results we note an acute case evidencing necrosis of the epitympanic space, one with purulent infiltrate into the muscular tissues of the neck, and a case of otomycosis. His other negative results were regular cases which failing to react were operated upon. The three subperiosteal cases gave excellent results after simple incision to afford an outlet for the accumulated pus.

When medicine receives a new method of therapeutics and when such a line of treatment is not based upon a previously accepted theory, it is obvious that its empirical application to all sorts of cases is more or less a necessity until finally enough material has been subjected to trial, and from the judgment of results obtained the applicability of the suggested therapeutical agent eventually becomes limited to those cases wherein its empirical application had demonstrated the best practical results.

Hence we are not surprised to find the method employed by Bier and reported upon by Keppler not only in an attempt to cure pure cases of acute otitis media, complicated and uncomplicated by mastoiditis, but also find chronic otitis media with cholesteatoma and sequestra in the mastoid subjected by them to the influence of the method.

Because of Bier's negative results in the latter, Heine eliminated all such from among the cases he selected for congestive hyperæmia, nevertheless he employed the treatment in a case evidencing necrosis of the epitympanic space, a case of

otomycosis of the external auditory canal and drum, otitis media which had persisted for a long time prior to being brought under treatment, besides a case wherein the muscular tissues of the neck were infiltrated with pus, a Bezold's mastoiditis and subperiosteal abscesses, etc.

Neither Heine nor Keppler evidently had the benefit of each other's observation whereon to base an outline for the indications leading to the employment of hyperæmic treatment.

Again, it must be self-evident that, other things being equal, if we find certain results from the empirical exhibition of a new therapeutical agent recurring with more than coincidental frequency, always more or less under similar circumstances, an analysis of these conditions may lead to the hypothesis upon which the given results are obtainable.

A closer examination of the published case-histories of both Heine and Keppler presents the evidence that the results obtained were almost invariably good in all acute cases wherein the Bier bandage had been applied early in the course of the disease. Therefore I limited the trial of the method only to such acute cases which came early under my observation in the course of their ear disease. Chronic cases I eliminated, because enough evidence was already at hand, in the first place, of a lack of certainty in results among such, and in the second place, because chronic cases being ambulatory would hardly submit to hospital confinement and bed-rest for weeks at a time when assurances of cure without operation could not reasonably be held out.

Since beginning work along these lines, and while this paper was in preparation, two other publications have appeared on the result of the Bier method in ear cases in general. Stenger ("Die Bier'sche Stauung bei akuten Ohrenerkrankungen," *Deutsche med. Wochenschrift*, Feb., 1906, No. 6) not only used congestive hyperæmia according to Bier, but also employed suction stasis.

His cases consisted of 11 acute suppurating ears without accompanying mastoiditis and 7 cases with pronounced mastoiditis. Upon a series of chronic cases he is as yet not ready to report. Irrespective of the cause in the given case,

his results were complete cure in six cases whose duration previous to treatment had been three to four days, ear function re-established in about eight days after stoppage of the ear discharge, a result obtained usually in from nine to eleven days. Among the cases lasting longer before treatment was begun he obtained two cures in four cases. Suction stasis gave him favorable results in the other cases reported upon.

The other publication was that of F. Colley ("Betrachtungen und Beobachtungen ueber die Behandlung akute eitrige Prozesse mit Bier'sche Stauungs Hyperæmia," *Muench. med. Woch.*, Feb. 6, 1906), who reported the favorable outcome of one acute case treated according to Bier's method.

My conclusions, arrived at from the study of Bier's, Heine's, and Keppler's cases, is thus substantiated by the published histories of both Stenger and Colley, and additional evidence is given of the efficacy of induced hyperæmia when early applied, whether the given case is complicated or uncomplicated with mastoiditis.

Before proceeding to enumerate further indications and contra-indications, and the theory adduced from the results obtained, we will briefly state the technique for the application of the method, because both the indications and the contra-indications are only understandable when the technique is clear.

*Technique.*—The patients are put to bed after the performance of paracentesis, and receive about their neck the application of a rubber, slightly elastic, bandage,  $1\frac{1}{2}$  inches in width (children  $\frac{1}{2}$  inch), and suitably long to fit snugly around the neck. This is fastened at the ends by hook and eye. The pressure maintained must be sufficient to cause only a slight cyanosis of the face, but not so tight that pain is felt in the congested region, *which should be warm to the touch*. The regulation of this pressure is soon learned by experience. During the course of treatment the rubber stretches, and the bandage must be frequently inspected, and, if necessary, tightened.

The bandage is placed in position in the morning, and remains in place twenty-two hours, and after a pause of two

hours is again replaced. These are the directions laid down by Bier and Heine. I have aided the induction of hyperæmia of the head by raising the foot of the bed so that the patient's head shall be lower than his feet. I find that this aids considerably, and the bandage need not be applied as tightly as when this procedure is omitted. Where pus is evidently superficially over the mastoid region, Bier's method demands incision into the suppurating mass only large enough to afford egress to the purulent contents of the abscess; no packing is introduced into the cavity.

I found that, with the exception of the first few hours, the tight bandage was well borne, and its tightness not complained of even by young children. Two of my cases experienced some trouble during the act of swallowing, but this was obviated by the removal of the bandage during the ingestion of food. The relief of pain is noted very early by the patients, and Keppler found this so marked in some of his cases that he reports patients as asking for the replacement of the bandage because of recurrence of pain during the periods of intermission in the treatment. Earlier observers used the Bier constriction bandage exclusively, but I have combined it with the systematic douching of the ears at regular intervals. Discomforts even in the corpulent were not demonstrable to any who have employed the method.

*Indications and Contra-indications.*—The bandage so applied, the bed in proper position, a condition of hyperæmia is induced in the head by mechanical interference with the superficial circulation. It must therefore follow that patients who have cardiac lesions or kidney trouble are not eligible candidates for this treatment. An uncompensated heart already laboring under difficulties might be gravely affected if called upon to act against the increased resistance of the bandage, with its resultant capillary stasis.

To infiltrate the head tissues with the vital organs contained therein with an artificially produced œdema fluid containing products of metabolism in excess because of kidney lesions was thought unwise, Stenger also calling attention to this; hence both these pathological conditions, where evi-

denced by the physical or the urinary examination, are held as distinct contra-indications to the employment of the hyperæmic treatment.

Arteriosclerosis, with its non-elastic, hard arteries, is also considered contra-indicative; for the increased congestion of the head conceivably might produce a rupture of an overburdened cerebral artery, with disastrous results.

It follows therefore that the old and senile are not to be subjected to this treatment without undertaking greater risks than they would take under the usual lines of treatment, and in adults only those in whom a thorough physical examination reveals freedom from cardiac and renal diseases should hyperæmic therapeutics be tried. Among children and robust adults the best results are to be expected.

Stenger considers adenoids a contra-indication; his reasons for so doing are not clear, and in some of my cases, one with double involvement, adenoids and tonsillar hypertrophy were present, yet the cases demonstrated no unusual results from the effects of the bandage. Until more definite reasons are shown, I hold that the presence of adenoids does not constitute a contraindication.

Eliminating all cases wherein the given contra-indications obtain, and limiting the cases subjected to trial to those coming early under observation, I tried this method in the following cases, and while I realize that the material submitted is small, still the uniform results obtained when the given indications were kept in mind entitle me to report upon them and draw conclusions, so that others taking up this work will not waste valuable time along lines which already have shown no results, but rather cause them to investigate along the line herein outlined, so that my results will either be contradicted or substantiated.

*Cases.*—The material submitted to the hyperæmic treatment consisted of seven cases of acute otitis media purulenta with acute mastoiditis, and one case of distinct subperiosteal abscess. Among the cases there were two having both ears affected—that is, I used the method on ten acutely diseased ears.

Those reported as hospital cases were sent to the wards of

the Manhattan, Eye, Ear, and Throat Hospital by my chief, Dr. W. C. Phillips, for mastoid operation, and although some of them were not in such imminent danger of life that immediate operation was imperative, still these cases and those reported as private cases would all have been operated upon under the usual methods of treatment, because after the first day they exhibited all the usually accepted indications for operation. In this connection attention is called to the blood count of Case 8.

Of these cases all were completely cured except one — of which more hereafter, — the membrana tympani normal in an average of from five to six days.

The duration of all these cases prior to treatment was relatively short. Only once were symptoms such that the indicated operative measures could not safely be further postponed beyond twenty-four hours. This was a double involvement whose duration before coming under my care was a little over two weeks. This case then is also instructive as substantiating my claim that only when used early is the hyperæmic treatment of advantage.

Compared with the results obtained when cases usually clear up after mastoiditis, I find that the time required for the re-establishment of the ear function is decidedly shorter than when the usual treatment is employed.

The bacterial findings give no key to the results obtained: mixed infections yielded as readily to the treatment as the staphylococcic invasions, and it is noteworthy that the case operated upon evidenced the invasion of an extracellular diplococcus infection.

CASE 1.—Female, nine years of age, coming under observation at the Manhattan Eye Ear, and Throat Hospital on October, 3, 1905, complained of pain in the left ear, and a discharge which had persisted for three days. Examination revealed a perforation in the drum which was red, swollen, and pulsating, showing pus retention in the tympanic cavity. The canal was narrowed and mastoid tenderness was present. The existing perforation was enlarged, and a bacterial examination of the discharge made, showing a mixed infection. The patient was admitted to the wards by Dr. W. C. Phillips, and under my

direction the Bier bandage applied twenty-two hours daily. Hot hydr. bichlor. douches (1:2000) were administered. The temperature rose on the morning of the second day, but the ear discharge had already begun to look less purulent, and the operative measures were postponed, and the bandage treatment continued. The temperature curve steadily fell from the evening of the second day by lysis. The ear was entirely dry on Oct. 14th, and practically normal in appearance on the 15th, when patient was discharged. The mastoid tenderness was less on the second day, and absent on the fourth day.

CASE 2.—Male, aged five years, came under observation Dec. 30, 1905, because of acute mastoid disease demanding operation in the opinion of the family physician. A mastoiditis was found evidencing distinct tenderness on pressure over both tip and antrum. The drum was swollen, no landmarks visible, and the canals narrowed. Temperature 101.6° F. The child had complained of intermittent pain in the ear for about a week and steady pain for the last three days. Adenoids and hypertrophied tonsils were present.

Upon agreement with the family physician operative measures were postponed and the Bier hyperæmic treatment undertaken after a paracentesis had been made. The bandage was at once applied and was so well borne after the first three hours that its presence was unnoticed by the child. No interference with the act of drinking was manifest. Hot bichloride of mercury douches (1:2000) were given every four hours.

The temperature fell by lysis and the discharge became watery on January 4, 1906. The ear was dry on January 6, 1906.

CASE. 3.—Female seven years of age, seen December 30, 1905, at the Manhattan Eye, Ear, and Throat Hospital. The case presented a double mastoiditis, complicating acute otitis media purulenta which had existed four days before her appearance at the hospital.

Both drums bulging, swollen, and red. Canals narrowed, and on the right side a distinct sinking of the posterior superior quadrant.

No infiltrate on the mastoid regions demonstrable. Bacterial findings after paracentesis evidenced a mixed infection. Adenoids and hypertrophied tonsils present.

Case was sent to the ward by surgeon, the temperature on admission being  $102.4^{\circ}$  F.

The Bier constriction bandage was applied and well borne. Pain ceased to be complained of almost at once. The ears were regularly douched with hot bichloride of mercury solution.

The temperature fell by lysis, and the discharge changed from a purulent one to a discharge of watery character on the fourth day of treatment. Mastoid tenderness absent on both sides on the fifth day.

The child was discharged from the ward of the hospital on the eighth day of treatment, with both ears dry and hearing as well as before attack, as far as it was able to be proven.

CASE 4.—Male thirty-nine years of age. Physically in good health. A waiter by occupation. Appeared at the Manhattan Eye, Ear, and Throat Hospital, January 6, 1906, suffering from a severe pain in right ear.

He attributed his ear troubles to a cold. Examination gave a membrana tympani on the right side red, swollen, and markedly bulging, with a small perforation in the superior-posterior quadrant, from which a pulsating purulent thick discharge came away. A paracentesis was made to enlarge the perforation, and the patient instructed to douche the ear t.i.d. with hot bichloride of mercury (1:2000).

His condition improved for a time, but on the 18th of January the pain in the ear recurred. The drum again evidenced bulging. The superior wall of the canal showed itself sinking. The mastoid evidenced pain on pressure over antrum. No oedema was observable over the mastoid region.

A second paracentesis was performed and the same treatment given as at first, but the temperature rose to  $102.2^{\circ}$  F., and the case was sent to the wards for operation on the 19th of January.

The Bier treatment was administered, the bandage applied twenty-two hours each day. It was well borne, except for the inconvenience experienced by the patient during the taking of food, which required its removal during these times.

The bacterial findings showed the extra-cellular diplococcus. The character of the discharge at admission was thick, creamy, and profuse in amount.

On the second day of treatment there was less discharge and it was less creamy in character. The mastoid tenderness to

pressure hardly noticeable and the temperature began dropping.

January 22, 1906, found the patient very comfortable, discharge rather less in amount and muco-purulent. January 23d, discharge distinctly watery and temperature normal. The bandage was continued, however, and full diet permitted.

January 26th. Ears dry, drum normal, and light reflex present. The bandage was still continued in position for another day and the case returned to the out-patient department, where, when seen a few days later, he appeared as well as ever.

CASE 5.—Female, nine years of age, came to the Manhattan Eye, Ear, and Throat Hospital, February 6, 1906, suffering with pain in both ears, giving a history of pain in the ears, lasting for about two weeks on the left side and not clearly able to say how long on the right side.

Examination revealed a double acute mastoiditis complicating acute otitis media purulenta on both sides.

The right drum was red, swollen, and bulging. The canal somewhat narrowed. The left evidenced a perforation with a purulent discharge. Both mastoids were exquisitely tender to pressure.

Paracentesis performed on both sides to enlarge the perforation on the one side and to afford egress for the retained pus on the other.

Bacterial findings demonstrated an extracellular diplococcus as the invading organism.

The temperature on admission to the wards was 102° F. The Bier bandage was applied and the hot ear douches administered.

The next day no improvement being noted and the canals evidencing a further narrowing, the discharge from both ears showing no signs of being influenced by the treatment, and the patient's general condition unimproved, it was decided to operate, the temperature rising to the time of operation.

Both mastoids were opened in the usual manner.

The further history of this case is not of moment, regarding the Bier hyperæmic treatment.

CASE 6.—Male, twelve years of age, seen by me at the request of the attending physician, March 6, 1906.

The patient had complained of intermittent pain for a few days, which developed into an acute earache for two days prior to my visit.

Examination revealed the boy having had hypertrophied tonsils and adenoids, with mastoid tenderness very well marked over the right mastoid process. On this side the drum was red, swollen, and bulging, and the canal distinctly narrowed. Temperature 103.2° F.

Bacterial findings evidenced staphylococcus invasion. Hot bichloride douches were administered, and the Bier bandage applied for twenty-two hours a day. The bandage was well borne, except during the act of swallowing.

Immediately after paracentesis the ear began to discharge profusely.

The morning of the second day found the temperature still higher and no improvement in the character of the ear discharge, and after consultation with the attending physician it was decided to operate upon the patient that afternoon, but at an examination made in the afternoon the temperature curve had begun to drop, the discharge meanwhile taking upon itself a less thick and creamy character.

It was deemed safe to postpone the indicated operative measures and watch developments.

The following day the mastoid tenderness had entirely disappeared and the discharge was distinctly watery. Temperature normal.

On the fourth day of treatment the ear showed moist, and on the sixth day entirely normal in appearance.

CASE 7.—Male, aged six, came under observation April 10 1906, at the Manhattan Eye, Ear, and Throat Hospital, giving a history of having had a cold two weeks previous, and immediately following this, a discharge from the right ear which, after persisting two days, entirely disappeared.

Five days before appearance at the clinic there appeared a swelling behind the right ear, which has since gradually become larger and is very painful.

The otoscopic picture gives a drum normal, except for the transparent scar of a healed perforation in the inferior-posterior quadrant, lapping into the anterior-inferior quadrant.

The auricle stands off from the head and a swelling is evident behind it, extending upwards beyond its line of insertion, and down to a  $\frac{1}{2}$  inch beyond the tip of the mastoid process. The swelling extended backward about two inches. The swelling

evidenced fluctuation and is exceedingly tender to pressure. The diagnosis of subperiosteal abscess following mastoiditis was made and the case sent to the wards.

Under anæsthetic a small incision was made,  $\frac{1}{2}$  inch in length, in the line of the usual mastoid incision, deepened to the bone and through the periosteum. Large quantities of pus welled forth, and a probe introduced through the incision evidenced diseased bone underneath, although the fistulous tract could not be found.

A small wick of gauze was placed in the wound to provide drainage and an outer dressing applied.

The Bier bandage was then applied about the neck and left on for twenty-four hours when it was tightened and thereafter left in position twenty-two hours each day.

On April 14, 1906, four days after admission, the dressings were removed and the ear inspected. No pus was demonstrable in the wound. The swelling had entirely disappeared and no pain felt on pressure.

The patient was discharged April 18, 1906, cured.

When seen on May 5, 1906, there was no recurrence evident, and the patient seemed as well as ever.

CASE 8.—Female, aged five, came under observation on April 28, 1906, giving a history of having recovered from measles two weeks previously. Pain was complained of in the right ear, gradually becoming worse, and five days ago the ear began to give a purulent discharge. The temperature when first seen was  $103^{\circ}$  F.

The drum on the right side red, bulging, and the canal distinctly narrowed.

Bacterial findings evidenced mixed infection. The perforation was enlarged, and the case sent to the hospital, where the Bier bandage was applied. A blood examination was made by Dr. Zabriskie, the pathologist, with the following results:

Hæmoglobin .....	60%
Erythrocytes .....	4,576,000
Leucocytes.....	15,111
Differential count:	
Large mononuclear lymphocytes.....	7.0%
Small " " .....	29.0%
Polynuclear neutrophiles.....	59.2%
Mononuclear leucocytes.....	1.0%

Transitional forms .....	3.0%
Eosinophiles.....	0.8%

Plasmodia not present.

On May 4th, the discharge was very slight in amount, and watery. On May 6th, ear dry. The temperature rose to  $101.8^{\circ}$  on the second day, and then fell to normal, but on the third day again rose to  $101.6^{\circ}$ , after which it fell by lysis to normal, and remained so when patient was discharged on May 7th, cured.

Seen on May 10th apparently as well as ever.

*The Dangers of the Method.*—The application of the method, while simple in itself, and easy of employment, carries with it one danger which I must touch upon to complete this paper. In cases which do well under its employment the clinical picture changes rapidly, favorable progress which ordinarily in the course of an acute otitis media would take some days, under the influence of the hyperæmic treatment will be reduced to hours. Therefore the strictest and most competent otological supervision is necessary to avoid missing the proper moment for surgical interference, should this become imperative.

What shall be the guide to determine when to proceed to operation? When the pus discharging from the ear does not change in character from a distinct creamy purulency to a more watery consistency within forty-eight hours, even if the mastoid tenderness be less—for it will always be found so under the influence of the bandage,—then operation is indicated.

If the fever curve, instead of falling by lysis from the end of the first day of treatment, either drops suddenly only to rise higher, or remains stationary, or rises from the first steadily higher, then, whether or not the patient's subjective sensations are apparently improved, operative interference is imperatively indicated. Should operative measures be delayed, there will be found upon the operating table a mastoid whose contents are in an advanced state of disintegration, with possibly the vital structures in it exposed to its purulent contents—a state of affairs wholly out of keeping with that which one would expect from the clinical picture of the given case (Heine reporting one such). Under no circum-

stances should the hyperæmic method of treatment be employed by others than trained and experienced observers capable of recognizing the approach of the danger zone in time to avoid its consequences.

*Theory of Action.*—Neither Heine nor Keppler formulates any theory to account for the results each obtained, nor is this to be wondered at, since they used the method promiscuously, but when the applicability of a therapeutical procedure is limited to acute suppurating cases, and we find that the results obtained seem to be uniform when the given indications are kept in mind, obviously some underlying principle is called into action to secure these results.

We know that interaction between invading bacterial organisms and the body tissues takes place whereby a substance is produced in the body tissues inimical to the bacteria (Park, "Nature of the Protective Defences of the Body," in his book entitled *Pathogenic Bacteria and Protozoa*, 1905). Conceivably this interactivity must take place in the region of the infected parts. Furthermore, through the action of the enzymes, or by reason of the production in the body of this bactericidal substance, it is conceded that body resistance is usually heightened during the first two hours, to a period from several days after infection. This heightened resistance must also be greatest around the seat of the lesion, and the damming back of the blood stream by the neck bandage, when applied early in the course of the disease, produces an artificial œdematous condition of the tissues, and brings more anti-bacterial fluids to act on the organisms present than would take place were no œdema produced.

In this connection it is interesting to note an experiment undertaken by Colley (*l. c.*). By bringing bacteria of known virulence into contact with œdema fluid from a congested limb the seat of a suppurative process, the author was able to prove that a distinct bactericidal action not present in serum from a normal limb was developed in the body fluids of a region subjected to congestive treatment.

Reading the result of Colley's experiment in the light

of our knowledge of body immunity, the explanation of the beneficial action of the Bier method of treatment becomes clear. The nature of the invading organism plays a small rôle, as shown by my cases. That increased resistance is produced and cures thus effected I have no doubt, because of the results of my observations.

Because the bandage application more nearly fitted my theory, it was exclusively employed by me; no incisions were made except into the membrana tympani. The production of hyperæmia by means of various suction cups, and after incisions over the mastoid, seems to me to be a contradiction of terms as advanced. In the latter case, an active hyperæmia is produced with attendant blood-letting, and while not disputing the results obtained, for we all know the good procurable from the application of leeches and the Wilde incision, yet when the incision is combined with suction cups, the results thus obtained are ascribable to the active blood depletion, and not to induced congestive hyperæmia. Furthermore, the chiselling of a hole down to the mastoid antrum and the application of suction—the performance of an incomplete operation (for such I term the method advanced by certain observers, among these Stenger, *Deutsche med. Woch.*, Feb. 8, 1896), with its attendant necessary anæsthesia—is certainly less satisfactory and less in accordance with surgical principles than the regular mastoid operation whose results we know and from which we have heretofore obtained satisfying results. If the patient's condition demands operation, then half measures are a useless waste of time and the method advocated a dangerous procedure.

In conclusion we summarize our observations of the Bier method for the treatment of otitis media acuta either with or without mastoiditis as follows:

1. If used early it will greatly increase the probabilities of curing the condition without resort to major operative measures.
2. In cases cured under its influence the re-establishment of ear function will occur quicker than under the usual line of treatment.

3. Its use by the inexperienced is absolutely dangerous.
4. Its employment should be limited to the young and the otherwise healthy.
5. Finally we submit that when the indications are kept in mind and when properly and intelligently used, induced hyperæmia will be found a measure destined, when its scope and limitations are better understood, to find a permanent place in otological therapeutics.

A CASE OF BRAIN ABSCESS FOLLOWING TRAUMATISM AND ACUTE MASTOIDITIS.  
OPERATION. RECOVERY.

A CASE OF HYSTERIA SIMULATING BRAIN  
ABSCESS AFTER OPERATION FOR  
SECONDARY MASTOIDITIS.<sup>1</sup>

By ALFRED WIENER, M.D.

SOME interesting features in these cases have led me to place them on record.

CASE 1.—L. M., forty-three years of age, Italian by birth, married and has eight children. On April 6th was at work digging in a pit about fifteen feet deep, when suddenly the boards which are used for shoring up the sides of this excavation gave way, and struck him over the right side of the head. He fell to the ground, but appeared to be dazed only momentarily. As he arose it was noticed that he was bleeding from the right ear. He complained of feeling dizzy and of pain in his head. The patient was seen about three hours after the accident, during all of which time he was conscious and perfectly rational. On examination at that time the patient presented the following status: A man of normal build, with good muscular development. His inability to understand, when addressed in his native language, and his bewildered look at once attracted our attention, and a careful examination of the hearing was made. In the right ear, in spite of the bleeding and rupture of the drum, when spoken to in a loud tone he understood everything that was said to him. In the left ear the patient appeared to hear, but he could not be made to understand. After being spoken to several times he would repeat one or two words of a sentence and then look

<sup>1</sup> Reported before the Otological Section at the Academy of Medicine, New York, April 12, 1906.

bewildered. The tuning-fork tests were as follows. The Weber test was uncertain. The Rinne was negative in right ear and uncertain in the left. Bone conduction was good on both sides but somewhat lengthened.

Otoscopic examination.—Right ear: The canal was filled with dirt, oozing blood, and blood clots. After these were carefully removed, an oval and ragged-shaped perforation was visible in the posterior half of the tympanic membrane through which blood was still oozing.

Left ear: Nothing abnormal was noticed. An examination of the eyes did not reveal any nystagmus or other unusual condition.

The optic disks were normal; the deep reflexes were very much diminished even under re-enforcement. Not the slightest paralysis could be detected in any of the muscles supplied by the cranial nerves.

*April 7th.*—The condition was about the same as on the previous day, probably a little more pain in the head. The dressings which were removed were stained with blood, and there was blood still oozing from the canal. In addition a slight serous discharge was noticeable. The pain was localized over the antral region of the mastoid and the temporal regions of the skull. The pulse rate was 74 and the temperature was 99.2° F. A test made of the hearing showed the same result as on the previous day.

*April 8th.*—There has been less oozing of blood and more of the serous discharge. The pain comes on periodically.

*April 9th.*—The patient begins to understand simple questions when they are repeated several times in the left ear. Condition in the right ear is about the same; there is no longer any bleeding from the ear, but a large quantity of serous discharge.

*April 10th.*—The hearing and ability to understand have decidedly improved. There is less serous discharge from the right ear. There is still some pain over the antral region of the mastoid, especially to percussion.

*April 11th and 12th.*—The patient was feeling so well that he was allowed to sit up. There is no temperature. The pulse is 74 and the serous discharge has ceased.

*April 13th to 20th.*—He has been improving during all this time. His hearing in the left ear is now entirely normal. He is out of bed and around, and complains of nothing with the exception of the tinnitus.

*April 20th.*—He suffered an attack of acute tonsillitis, and on the following day complained of pain in the right ear. So rapidly did the infection spread that within thirty-six hours there were present all the symptoms, subjective and objective, of an acute otitis media purulenta. On the 22d the tympanic membrane ruptured through the thin scar of the old perforation, but the opening in the drum had to be enlarged to afford better drainage. About the same time the patient began to complain of excessive pain, especially in the ear and antral regions of the mastoid. On the 24th and 25th the discharge was free and abundant, but the canal was decidedly narrowed. On the evening of the 26th the pain had extended over the mastoid process, especially over the posterior border and antral regions. There was also some headache. The temperature was  $102^{\circ}$  and the pulse 80. The next day the temperature had arisen to  $103^{\circ}$ . The pain over the mastoid was severe, and extended over the entire right side of the head. The canal was so narrowed that the tympanic membrane was scarcely visible. An operation was advised, but no consent was obtained until the following day. On that day the temperature was  $103.5^{\circ}$  and the pulse 100. The patient was complaining bitterly of pain and had vomited twice. Both eyes were examined and the disks found normal.

The consent to operate having been obtained, the mastoid was opened. The whole base of the mastoid and antrum were filled with pus, granulation tissue, and broken-down cells. At the tip only very little secretion was present. As the mass at the base was removed it was found to extend right up to the dura of the middle fossa, showing that the roof of the antrum and tympanic cavity had been completely destroyed. The sinus was laid bare but found healthy to external appearances. On the dura of the middle fossa there was noticed some granulation tissue, marking the former site of the roof of the antrum and tympanic cavity. As sufficient was found in the wound to account apparently for the symptoms present in this case, it was thought wise not to do anything further. The wound was packed and the usual dressings applied.

On the following day the temperature dropped to  $101^{\circ}$ , but in the evening had again arisen to  $104^{\circ}$ . The pulse rate was 64 and the patient appeared to be suffering a great deal of pain.

There were alternating periods of slight delirium and depression. As the condition was practically the same on the following

morning, with a pulse of 60, and he had vomited several times, I decided to open the wound for exploratory purposes. Previous to this the eyes were again examined and found absolutely normal. Not the slightest disturbance in the region of any of the cranial nerves could be detected. The dressings were removed, and the sinus carefully examined and again found normal to external appearances. The granulation tissue over the dura covering the middle fossa was scraped, and it was found that the dura in this region was discolored. A narrow scalpel was passed through this region, and was immediately followed by a leakage of pus. The incision was enlarged, and the whole posterior portion of the temporo-sphenoidal lobe laid bare. An abscess, or rather an ulcerated area of brain tissue, representing a cavity of about one-half inch in depth and one inch in length was exposed. This was carefully washed out with a stream of normal saline solution, and then powdered with one part of iodoform to three of boracic acid. An iodoform gauze drain was placed therein and the rest of the wound covered with the usual dressings. The patient was put back to bed and the wound was dressed daily for a week. The patient showed daily improvement, and after two weeks I allowed the wound to close, and he made an uninterrupted recovery.

REMARKS: After a traumatism a patient suffers with hemorrhage from the ear, and amnesic aphasia in the ear opposite to the side of the lesion. Within a few days after the accident the hemorrhagic discharge is replaced by a serous discharge. This ceases after a few days and the patient is on the way to recovery, when he suffers from an attack of tonsillitis, followed by an acute otitis media purulenta and mastoiditis. The mastoid is opened, and sufficient appears to have been found to account for the cause of his symptoms.

Neither the temperature nor the symptoms appear to be appreciably affected by the operation; other serious symptoms appear, and on further exploration an abscess is found in the posterior portion of the temporo-sphenoidal lobe. This is opened and drained and the patient rapidly recovers. What conclusions were arrived at, and what was done in the way of treatment, is amply supported by the following consideration of the various features in this case.

During the first twenty-four hours it was impossible to establish the fact, whether this patient was suffering from a fracture of the skull or not. What especially strengthened the belief in such a diagnosis was the presence of hemorrhage from the ear, with amnesic aphasia. Hemorrhage alone from the ear, however, may result from a number of different causes: A rupture of the tympanic membrane, a fracture of the anterior wall of the external auditory meatus, a forcible separation of the cartilage of the external canal, a fracture of the posterior wall into the cells of the mastoid process, or, finally, a fissure or fracture at the base of the skull. Hemorrhage becomes a suspicious sign if there are connected with it certain other symptoms. During the first twenty-four hours there was some doubt in regard to the presence of a fracture of the skull, as I could not satisfy myself that there was present an amnesic aphasia in the left ear. However, a careful examination made on the second day left hardly a doubt in regard to its certainty. The patient seemed to make every effort to comprehend what was spoken into his left ear, but it was impossible for him to answer intelligently the questions put to him. He was suffering from word deafness. He could distinctly hear, as was proven by the tuning-forks and other tests, but would look at one in a bewildered and puzzled sort of a way, showing distinctly his lack of the power of comprehension. It was, therefore, not a case of simulation. As soon as the bleeding ceased, a contraction of the subdural clot, which was causing the pressure over the temporo-sphenoidal lobe, naturally followed, and the amnesic aphasia began to disappear. The presence of the *unilateral* aphasia is interesting. That such a condition may occur has been shown by the experiments of Ferrier. He has on many occasions after extirpation of the auditory area in one hemisphere, observed impairment of hearing in the opposite ear, and at the same time has not been able to detect the slightest impairment in the ear on the same side. This was exactly the condition in the above patient. He could hear every word that was spoken in a loud tone into his right ear, but could understand practically nothing that was addressed to him in his left ear, the one

opposite to the site of the lesion. In addition to the above positive symptom, there appeared, beside the oozing of blood, a serous discharge which at once made evident the diagnosis of fracture. One must bear in mind, however, that the simple discharge of a serous fluid does not always signify fracture. Von Bergmann has related a number of instances in which there had been a free serous discharge after injury to the skull, not due to fracture at the base. In cases reported by Prescott, Hewett and Gray, Marjolin and Wilson, the serous fluid came from the middle ear, as the base of the skull and the labyrinth were intact. Zaufal and Moos have called attention to the fact that, in the serous forms of otitis media, large quantities of serous fluid may come directly from the middle ear. Von Bergmann has come to the following conclusions in regard to the presence of a serous discharge from the middle ear. If it continues for some time, occurs at once, or within a few hours after the accident, it is positive evidence of fracture into the sub-arachnoid space. If it occurs after twenty-four hours, a basal fracture should be diagnosed if the reaction with silver shows a rich deposit. Absence of a serous discharge does not necessarily negate the presence of fracture.

With this positive evidence of amnesic aphasia, hemorrhage, and serous discharge, there was no longer any doubt but that a fracture had taken place. The amnesic aphasia was produced by the hemorrhage exerting direct pressure upon the posterior portion of the temporo-sphenoidal lobe. As soon as the hemorrhage ceased and the clot began to contract, the aphasia began to disappear. The patient had apparently recovered from the shock and the indirect symptoms produced by the accident, when he suddenly suffered an attack of tonsillitis, and almost immediately the middle ear became involved. This was followed by an acute mastoiditis and a direct extension of the infection into the middle fossa of the skull. This rapid course, with the formation of brain abscess, or, rather, ulceration of brain tissue, was favored by the lack of all resistance offered in the direct and easy pathway which the infection followed. I refer to the fracture in the skull and the tear in the dura, and the

remains of the old blood clot, which had probably not been entirely absorbed. The continuance of the symptoms after the opening of the mastoid, and at the same time bearing in mind the former presence of amnesic aphasia after the accident, strongly suggested an abscess of the brain. It led me to advise a second operation for the purpose of exploring the middle fossa in the region of the temporo-sphenoidal lobe. This resulted in finding the abscess, which after the proper treatment rapidly healed, and the patient made an uninterrupted recovery.

CASE 2.—L. K. is twenty-two years of age. Three months previous to the time that I first saw the patient, he was operated upon for an acute mastoiditis. This occurred on the right side and in an ear which had undergone middle-ear suppuration after scarlet fever. It had ceased to discharge about six months previous to the time that the acute condition above mentioned had taken place. It appears from what the patient told us, that as the suppuration in the canal continued after the above operation had been performed, and the wound behind the ear would not heal properly, a second operation was done. This time the wound back of the ear closed promptly, but the discharge from the canal continued. About two weeks previous to the time that he came to me the original wound in back of the ear again broke down, and there was some pain in the ear.

On examination at my office January 21, 1906, he presented the following status: The hearing in the right ear to ordinary conversation was about one and one-half feet. In the left ear conversation is heard at about seven inches. The tuning-forks showed Weber lateralized to the left ear, and Rinne negative on both sides. Bone conduction is good.

On otoscopic examination the right ear shows a canal which is very much narrowed and posteriorly filled by a small granulation. There is some secretion in the canal, but it is odorless. This granulation obstructs all view farther back. Behind the auricle can be seen the scar of the former operation, presenting two fistulæ. On probing, the one fistula leads in the direction of the antrum and the root of the zygoma. The other leads toward the tip of the mastoid process. The granulation in the canal was removed, and on the following day a small sequestrum about three millimetres in length was found in the canal and also removed.

Although I advised an opening of the wound behind the auricle, the family, in spite of all protests, persuaded me at first to employ milder measures. After three days the discharge in the canal ceased, and it appeared that the middle ear was responding to treatment. After ten days the patient began to complain of pain behind the auricle, in the region of his mastoid, and at the same time developed a temperature of  $105^{\circ}$ . I now refused to have anything further to do with the case unless I was allowed to clean out that mastoid. The consent was given and the patient was operated upon on February 8th.

At operation it was found necessary to cleanse the antrum and cells of the zygomatic root and to remove the tip. The sinus was exposed and found perfectly healthy.

On the day following the operation the temperature had dropped to normal and the pulse to 68. The patient no longer complained of pain; with the exception of a slight tenderness over the sterno-cleido-mastoid muscle, nothing unusual after a mastoid operation. With the exception of the pulse rate, which varied between 52 and 60 during the five days succeeding the operation, the patient appeared to be in excellent condition.

On the fifth day the dressing was removed, and nothing unusual noticed about the wound to attract my attention. About two hours after the dressing the patient complained of headache located especially over the top of his head. He refused his dinner and finally fell asleep. He had been sleeping about two hours when the nurse in charge noticed that the patient was becoming restless, and tossing about from one side of the bed to the other. Suddenly he began to talk in a disconnected manner, became very pale, and the pulse very weak. When spoken to he made no reply, and all efforts to arouse him were becoming more and more difficult. He became quite cyanotic, clammy to the touch, and his hands and feet were cold. All sorts of stimulation were resorted to, and when I finally reached the patient he had partially recovered from this condition of collapse.

An examination of the patient brought out the following: The patient was lying quietly in bed with his eyes closed, moaning at intervals and putting his hand up to his head. The pupils were widely dilated and responded sluggishly to light. An examination of the disks was negative. By watching the movements and play of the facial muscles no cranial palsy could be

detected. This was especially easy with the muscles of the eyeball, as he followed a light in whichever direction it was moved. The pulse rate was 50. The temperature was 100°. The heart, kidneys, and lungs were negative on examination. The deep reflexes were very much diminished. The dressing was at once removed, and not the slightest evidence found to account for this condition. When spoken to he made no response, but looked at one in an absent sort of a way. There was not the slightest evidence of any paresis. The sensation was carefully tested, and it was found that the patient was completely anæsthetic, with the exception of the soles of his feet and tips of his toes, within the palms of his hands and finger tips, and within the vestibule of his nostrils. The bowels and urine were emptied voluntarily, the nurse having been given instructions to look after these every four hours. The patient, however, gave evidence of his own accord later, when he wished to empty his bladder. The patient passed a restless night, complaining bitterly of pain on the top of his head, but recognizing no one and giving no response whatsoever to any questions. On the following day he was fairly quiet, complaining some of headache. The pulse rate varied between 52 and 60. The temperature was normal.

The area of anæsthesia remained the same. The deep reflexes were still very much diminished. About six o'clock that evening he suddenly, while being fed, began to talk and laugh and again appeared his natural self. When questioned about all that happened during the previous twenty-four hours he remembered nothing. One hour later I examined him and found everything perfectly normal.

His sensation had returned. The pulse rate, however, was still low, varying between 52 and 62. About nine o'clock in the evening he again relapsed into a sort of stupor exactly resembling the previous condition. He remained in this state until the following afternoon, when he regained his normal condition, and from that time on made an uninterrupted recovery. The pulse still remains at 60.

REMARKS.—The interesting feature in this case is the apparent collapse which occurred on the fifth day after the operation. A patient who has undergone two operations upon his mastoid, submits to a third operation in order to heal up two troublesome fistulæ, which have proven stubborn

to all treatment. During the five days following the operation the patient does apparently well. His temperature ranges between  $98.2^{\circ}$  and  $99.5^{\circ}$ , and he has no pain to speak of. His urine is normal in quantity and reactions. His pulse rate varies between 50 and 60. An examination of the heart at various times reveals it to be absolutely normal. On the fifth day the dressings are changed, and nothing unusual is noticed about the appearance of the wound. The patient is rather restless during the dressing, and rather upset by the pain produced by its removal. About two hours after the dressing he complains of headache, becomes restless, irritable, depressed, and passes comparatively into a condition of collapse. Stimulation is resorted to, and I see the patient shortly after he has partially recovered from this collapse. One of two things are at first suspected. Either a sudden hemorrhage within the cranial cavity, or the presence of a latent brain abscess which has suddenly made itself evident. The dressings are removed at once, but there is nothing present in the wound to account for the condition. The dura of the middle fossa and the sinus, both of which were exposed during the operation, on examination show nothing abnormal.

Hemorrhage was excluded for the following reasons: Instead of the rapid pulse, there was a very slow pulse, averaging about 50 beats to the minute. Instead of the frequent and irregular respiration, together with dyspnoea so often noticed in hemorrhage, it averaged between 15 and 19 to the minute, and was perfectly regular. There was no nausea or vomiting. The temperature, instead of being subnormal, was  $99.2^{\circ}$ . With these facts, and nothing evident in the patient to substantiate such a diagnosis, hemorrhage was excluded. The presence of a latent abscess of the brain was more plausible. First of all, this patient had been suffering from a chronic otitis media purulenta, off and on, since childhood. About six months previous to the acute attack, which necessitated an operation on the mastoid process, it had ceased to suppurate. We are well aware of the fact that the latent period of a chronic abscess varies much in duration. Gower says as long as from two to three months

to several years. Slight mental disturbances, usually of melancholic nature, have often been the only symptoms. This patient had been of a melancholy tendency for a long time, but it was due rather, as I found out later, to his increasing deafness. We know that such latent periods may end suddenly or gradually, due to the occurrence of an inflammatory œdema or softening around the abscess. What directed my attention at first toward the probability of brain abscess was the sudden onset of cerebral symptoms and a very significant sign of brain pressure—viz., the bradycardia. Nevertheless, the partial recovery of the patient, when I reached him, led me to make a careful neurological examination of the patient. As a rule, when the latency of a brain abscess is once broken, one expects the active symptoms to increase until death occurs. I was averse therefore to making any exploratory incisions until I could satisfy every reasonable doubt in regard to the presence or not of an abscess. Not the slightest paresis of any of the muscles supplied by the cranial nerves could be found. Neither was there any hemiplegia, paraplegia, or monoplegia. There was present not the slightest spasticity or rigidity in the muscles. The optic disks and blood-vessels showed nothing abnormal. The functions of the rectum and bladder were normal. The sensation was examined as far as it was possible. The patient was found completely anæsthetic on both sides of the body, with the exception of the soles of his feet and tips of his toes, the palms of his hands and finger tips, and within the vestibule of both nostrils. This at once aroused my suspicion, as such a distribution of anæsthesia would be difficult to explain. A lesion causing such extensive anæsthesia should undoubtedly present other focal symptoms. Furthermore, it would be difficult to explain the picture as presented in this case.

A careful inquiry was at once made into the family history of this individual. It was found that the mother was a highly hysterical individual, and that the patient was a boy with very little self-control, and not possessing much will power, and at times very wilful and at other times morose. It was decided to watch the patient for

twenty-four hours. The wisdom of this procedure was proven by what occurred on the following day. The patient again became conscious of his surroundings, recognized everybody about him, and was completely in the dark when questioned as to what had happened during the last twenty-four hours. His sensation was now entirely normal, but his pulse still retained its slow frequency. There was no doubt now that the condition was one of hysteria, and although he did lapse into a similar condition shortly afterwards, he was treated as an hysterical patient. He recovered from the second attack very rapidly, and from this time on made an uninterrupted recovery. The only persistent symptom is the bradycardia. We know that this symptom is sometimes produced by lesions in the nervous system where there is a direct involvement of the cardiac nervous mechanism. It has been noted in the early stages of meningitis, in apoplexy, and in tumors of the cerebrum and medulla. Finally there is a group of cases in which bradycardia is associated with a neurosis or is itself of this nature. I refer to hysteria, mania, and general paresis. In this individual it is certainly a neurosis, as no other evidence except of an hysterical nature has shown itself in connection with it.

## THE TREATMENT OF PURULENT OTITIS BY CONGESTIVE HYPERÆMIA.

By DR. WILHELM KEPPLER,

ASSISTANT, SURGICAL CLINIC, BONN (PROF. BIER).

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Dr. PERCY FRIDENBERG, New York.

THE favorable results obtained in acute inflammations of the extremities by the application of Bier's constriction bandage suggested a promising field for this method in analogous affections of the head. Accordingly, almost all inflammations and suppurations of the head and face applying at the Bonn Surgical Clinic or the Johannis Hospital within the last year and a half have been treated by congestive hyperæmia. This principle has been applied with special consistency, however, to the treatment of the most varied purulent inflammations of the middle ear, and it is a resumé of the observations in this field which is presented in the following treatise.

If we desire to determine the value or applicability of a new method, it is of importance not to make too narrow a selection for experiment, but to apply it even to cases which at first do not seem at all favorable. These considerations led us in the experimental study under discussion, and so all cases of aural suppuration, whether acute or chronic, uncomplicated or with mastoid involvement, were treated with the congestive hyperæmia. It is natural that complicated cases come into the surgeons' hands, and it will be seen that our cases were almost without exception complicated by disease of the temporal bone. But just such cases seem, if viewed in the light of the almost analogous

affections of the extremities, to offer a suitable field for this method. For if we can heal extensive and severe osteomyelitis of the long bones without producing necrosis, we should still more surely be able to count on similar results in the temporal bone. The comparatively small area of diseased bone, and, above all, the splendid blood supply of the head and consequent ease of applying hyperæmia, were all favorable to a good result. We shall see below how far these theoretic considerations were supported by practical experience, but here a few words as to the technique and physiologic action of congestive hyperæmia may not be out of place.

In regard to details of the mechanical procedure itself, only those points shall be considered which apply to inflammation and suppuration of the head. It is obvious that anatomic conditions limit the field of application of the congestion bandage, as the constrictor can only be fastened around the neck of the patient, a necessity which for a moment might cause some misgivings. This is entirely unfounded, however, as will soon be shown. The extraordinary vascularity of the head enables us to produce a marked degree of hyperæmia with relatively slight constriction, and pressure which would produce no symptoms of congestion at all if applied to the extremities, is sufficient, here, to cause a most intense reaction. These anatomic differences allow us to depart somewhat from the usual technique of Bier's treatment.

It is not necessary to encircle the neck of the patient with several tours of a constricting bandage, as a single elastic bandage is quite sufficient. In our cases a piece of ordinary cotton elastic or garter, about 3cm wide, was put round the neck and applied under slight tension. The garter should be almost as long as the circumference of the neck, one end fitted with a hook, the other with a number of eyes at various distances so that any degree of constriction can easily be obtained or the amount of congestion varied. The dosage of the procedure will be considered more in detail farther on, in the section on its mode of action.

The position of the bandage is often shifted, when used

on the extremities, in order to avoid symptoms of strangulation, but this is manifestly impossible in the neck, and generally unnecessary, if for the only reason that the slight pressure required is hardly sufficient to cause appreciable trouble. Still it is well to use certain precautions. The delicate skin of the neck should be protected by a single layer of a gauze bandage. More than one tour should not be used as this undoubtedly interferes with the uniform elastic pressure of the constricting band. The latter is fastened at the back of the neck, where the skin is toughest, and a bit of cotton or gauze padding placed beneath the hook and eye. The underlying gauze bandage should of course lie perfectly smooth. Daily rubbing with spirits of camphor may be used to toughen the skin. If in spite of these measures decubitus should appear, it does not necessitate an interruption of the treatment, as the skin lesion will heal with appropriate treatment with drying powders even under the constriction band. Still it may be as well to interrupt the constriction for a few hours each day, and to put a layer of cotton-wool under the elastic.

If the required degree of hyperæmia is not produced by the elastic, Henle's apparatus may be employed. This consists of a piece of rubber tubing connected with which may be bellows blown up by the patient. This is rather cumbersome, and, unless carefully fitted to the neck, is apt to fill up unevenly and produce painful, irregular pressure. It is particularly irksome at night. In special cases, as for instance where there are open wounds of the neck, necessary congestion could be produced by a number of tours of a flannel bandage, but this is hot and as a number of tours and a broad bandage are required, swellings low down in the neck would interfere with its use. As a matter of fact it would only be required exceptionally, and we have not been obliged to make use of the flannel bandage in a single case. The ordinary elastic will be found the most serviceable, but a new piece should be used every two or three days, as its elasticity rapidly deteriorates through sweat, etc., and fails to produce the necessary degree of hyperæmia.

In regard to the action of the congestion in affections of the head we can only repeat what has already been demonstrated for the extremities; as in all other diseases in which congestion treatment is indicated, the most striking effect is the relief of pain, which is usually prompt and reliable. Patients who have suffered with sleeplessness for nights, find rest, often after a single application. Large masses of inflamed glands, which were exquisitely tender, are rendered insensitive to fairly marked pressure by a short hyperæmization, and the patient, who may have been afraid to make the slightest motion of his head, has comparative freedom. The intimate causal connection between the congestion and the cessation of pain is shown most strikingly, however, by the recurrence of the latter symptom when the constriction is interrupted. Experiences of this sort popularize the method with the patients, who often of their own accord request the re-application of the constrictor before the time has come for it. Prompt relief of pain is the most striking feature of the procedure and serves as a reliable index of the right degree of congestion. If there is any complaint of increased pain, the bandage is certainly not lying as it should. It is generally too tight, and should be loosened, gradually and slowly however, even if the only discomfort be a sensation of pressure or fulness in the head. The statements of the patient are of the greatest value, especially to those who are still unfamiliar with the technique of the method, so that it is advisable to make the first applications in adults. After the entire clinical picture has been carefully studied in a few of these cases, it will be comparatively easy to interpret the objective symptoms which develop with congestion. Our experiences on this point may be of assistance. When the bandage has been correctly applied there will be some bluish-red flushing of the face and a somewhat swollen, sodden appearance.

In case the otitis be complicated by mastoid inflammation, a fiery red œdema develops behind the affected ear, but this is usually limited to the diseased area, in marked contrast to affections of the extremities in which the inflammatory redness often extends to the constricting band

after a single application. More extensive inflammatory reaction may also be met with in the case of large packets of diseased lymph-glands. A certain amount of œdema, which rapidly extends to the bandage, will also be met with, but this is a very variable symptom. In some cases the soft tissues of the neck hang down over the bandage like swollen sacs, in others the suffusion of the face, mentioned above, is the only sign of serous imbibition.

In regard to the length of time of constriction, we are in favor of long periods, averaging 20-22 hours daily. Of course it is necessary to individualize, and in case of marked œdema, the bandage may be removed an hour or so sooner. The excellent blood supply of the head will relieve the most extreme cases after a short interruption of the congestion, so that, as a rule, a period of 20 hours will not be too long. As the affection improves, the séances may be shortened, but it is well to continue for at least 10-12 hours daily, until some time after all inflammatory symptoms have disappeared. This need not prevent the patient from going to work, as no disturbances have been noted by us even in the presence of arteriosclerosis.

The influence of congestive treatment on the purulent process itself is almost as variable as it is in the case of the extremities. In one case a commencing suppuration is brought to a standstill or to absorption; in another, an acute pus-accumulation with the cardinal symptoms is changed into a cold abscess, more or less rapidly with a corresponding improvement in the general condition. In one of these cases, the pus was gradually changed into a serous fluid, but as it is our rule to incise all mastoid abscesses early, no further observation on this point could be made. Similar observations in regard to the extremities, especially in empyema of the joints, indicate that this is the usual result of the congestion treatment, the more so as the subsequent course of the cases, particularly of abscesses in the region of the head, after evacuation of the pus-suppurating lent color to this view.

In affections of the extremities, the application of the constricting bandage is usually followed almost immediately by

an increased production of thick pus, while after incision of abscesses in the region of the head, the same treatment leads to a prompt cessation of discharge. Even when large mastoid abscesses have been incised, the discharge generally becomes serous, and then in the course of a few days stops altogether. We have never seen gas-production or malodorous decomposition of the pus under the constricting bandage, but as these changes have occurred in hyperæmization of the extremities, although without any ill effects, a word of warning may not be out of place.

In regard to the influence of hyperæmization on inflammatory swelling and œdema, the experiences made in treatment of the extremities are accentuated. The inflammatory swelling at first increases, often doubling in size, and then grows smaller and eventually disappears without the constriction having been interrupted.

As to the treatment itself, this must be varied according as we have to deal with simple suppuration of the middle ear or with mastoid complications. In the former case, we may rely exclusively on the use of the constricting bandage, particularly if perforation has taken place and there is free drainage. If not, the perforation must be enlarged or another made at the appropriate point. In case no perforation has occurred, paracentesis is to be performed in the presence of the usual indications, with the hope of averting further complications by means of this simple procedure. If there be the slightest suspicion of pus-accumulation in the mastoid process, this should be incised at once. Even in case of a mistaken diagnosis, the small incision will do no harm, while in others this prompt action, together with hyperæmization, will save the bony structures.

At the beginning of our series these principles were occasionally sacrificed, solely for the sake of a more thorough study of the method, but it is by no means our intention to have our results, which were rather good, on the whole, serve to inculcate the principle of temporizing. Our standpoint is the old one, "*Ubi pus, ibi evacua*," and the sooner the better. As to the size of the incision, we have not yet decided. In general, we are in favor of small incisions, ex-

cept in the case of deep-seated gland abscesses. This point is, after all, of minor importance, compared to the necessity of avoiding all drainage and packing which are undoubtedly badly borne, and lead to permanent damage of the tissues, especially of the bone. The wound is simply covered with a sterile protective dressing, and freed of pus daily by vigorous expression. Suction apparatuses may be of use here, but we have not applied them. Bier's suction treatment has also been used of late in cases of suppurative otitis media.

A careful report of the cases seems particularly important, in view of the fact that the congestion treatment contravenes long-established theories as to the interpretation and treatment of acute suppuration. Furthermore, a detailed account of these twenty observations may dispel some false impressions as to our method. Our data may be divided into acute and chronic cases.

#### A.—ACUTE CASES.

CASE 1.—Aged ten. Pain, A. S., four weeks ago, lasting two days, and ceasing after yellow discharge appeared. Suppuration continues, and there is now severe pain in the left side of the head. S. P.: Head tilted to the left. Pain on manipulation. Upper wall of canal swollen and prolapsed. Drum red and swollen. Small perforation in the lower half, with profuse mucopurulent discharge. Extensive redness and swelling over the mastoid. No fluctuation. Pain on pressure. T.  $37.9^{\circ}$ . Congestive hyperæmia applied 22 hours daily. II, 20, '05. Constriction well borne. Face bluish-red. Mastoid tenderness almost gone. Signs of inflammation unaltered. Œdema more marked. No fluctuation. Canal cleaned daily and closed with a sterile tampon. T. normal. II, 25. Pain gone. Redness and swelling over the mastoid have disappeared. Discharge less. T. normal. III, 4. No discharge. Mastoid appears normal. Constriction stopped. III, 8. Patient discharged. Drum pale. Handle of malleus visible. Site of perforation cannot be made out. Hearing normal. Treated eighteen days.

CASE 2.—Aged thirty-one. Repeated discharge, A. S., in the last few years. Four weeks ago, fever and intense pain, A. S. Signs of inflammation disappeared a few days later when thin yellow pus began to run from the ear. This continues. For

two weeks, boring pain in the head, left side. 15, V, '04. S. P. Marked swelling of soft parts about A. S., which stands off from the head. Intense redness and œdema over the entire post-auricular region. Marked tenderness. No fluctuation. L. ext. aud. meat. full of thick, foul-smelling pus. Upper canal wall œdematous and prolapsed. Drum red and swollen. Large perforation below. H., A. S. o. T. 37.6°. Congest. hyperæm. with Henle's tube, twelve hours daily. No other treatment. V, 16. Mastoid tenderness much less. Discharge unaltered. Pus wiped away frequently. V, 25. Mastoid pain becoming steadily less. When the bandage is on, there is little pain on pressure. Signs of inflammation less marked. Redness and swelling almost gone. Discharge decidedly less profuse. Drum not swollen. Perforation persists, with pus discharging. VI, 2. Complete cessation of discharge for a few days. No evidence of mastoid affection. G. C. good. VI, 13. Discharged. Cured. Constriction to be worn for a few days. Under treatment four weeks. XII, '04. Feels well. Drum normal. No trace of the old perforation. Hearing perfect.

CASE 3.—Aged twenty-one. Influenza two months previously, in the course of which intense pain developed, A. S., disappearing soon after with discharge of bloody serum. A few days ago intense pain came on again, with marked tenderness over the mastoid. S. P.: A. S., stands off. Redness and œdema over left mastoid, which is exquisitely tender. No fluctuation. Marked sinking of upper canal wall hiding upper part of drum, which is dull and swollen. T. 37.9°. Cong. hyp., twenty-two hours daily, with elastic band, as usual. III, 14. T. to-day rose to 38.1°. Mastoid swelling more marked, with definite fluctuation. Incision made over mastoid, 3cm. long. After splitting the periosteum a small amount of sero-pus escaped. Wound covered with a sterile dressing. Cong. hyp. reapplied two hours later. III, 15. Marked cyanosis of face. Usual reactive redness and swelling over the mastoid. Dressings only slightly moist, but pus appears in the wound on pressure. Drum still bulging. Paracentesis. Fair amount of purulent fluid escaping. T. normal. III, 17. Pus still escapes from the ear. Region of wound still red. On pressure, pus oozes out of incision. III, 26. No discharge for a day or two. Operation wound healed. No pus on pressure. No inflammatory reaction. Constriction stopped. IV, 14. Discharged. Cured. Ear and

mastoid appear normal. V. at 12 m. Under treatment four weeks. VII, 1. Patient well and able to work.

CASE 4.—Aged thirteen. Stubborn influenza, beginning four weeks ago, with severe pain, A. S. Spontaneous perforation a few days later, with profuse purulent discharge. Soon after, fever came on and a tender swelling appeared behind the ear. Cold applications and daily syringing failed to relieve. I, 23, '05. Profuse discharge of foetid pus, A. S. Drum red and swollen. Small perforation in posterior quadrant. External meatus narrowed to a crevice by prolapse of upper wall of canal. Auricle stands off. Mastoid swelling size of a hen's egg, with marked fluctuation. Skin red and thinned. T. 37.6°. Treatment: Mastoid abscess opened by an incision at least 1 cm. long, discharging an unexpectedly large amount of pus. The rest expressed mechanically. Dressing forceps introduced shows bare bone, which is discolored, grayish-white. Wound not packed, but covered with a loose sterile dressing. Sterile tampon introduced into ext. canal. Cg. hyp. started two hours after operation. I, 24. Bandage has been worn twenty-two hours. Usual cyanosis of face. Free discharge of foetid pus. Dressing only slightly moist. On pressure there is only slight oozing of sero-pus from the wound, in spite of the large cavity. Neighborhood of incision shows the usual reactive redness and swelling. T. normal. Pus in canal wiped away several times daily. Wound cavity emptied by pressure once a day. Cg. hyp. twenty-two hours daily. I, 30. Discharge less. Inflammatory signs over the mastoid very slight. A few drops of pus can still be pressed out of the wound. II, 7. Since two days total cessation of discharge. Mastoid wound closed. Cg. hyp. reduced to twelve hours daily. II, 13. No constriction since a day or two. Drum normal. Mastoid not sensitive. Small linear scar. Hearing perfect. Discharged. Cured. Treated three weeks.

CASE 5.—Aged five. For 10 days, marked pain, left side of head, radiating to vertex. Since two days pain settles in the region back of the ear. Tender inflammatory swelling over mastoid since yesterday. XI, 19, '04. S. P.: A. S., stands off. Auricle red and swollen, also mastoid, which is very tender. No fluctuation. Drum dull, details invisible. No discharge. T. 38°. Cg. hyp. 10 hours. XI, 22. Exploratory paracentesis. Drum seems much thickened. A little blood, no pus escapes. Redness and swelling behind ear. Less pain. No fluctuation.

XI, 24. Decided fluctuation over mastoid. G. C. unchanged. Tampon in canal soaked with blood. Abscess incised. Cut 1 cm long over antrum. After splitting the periosteum, about 1 dram of thick yellow pus escaped. Probe shows disintegrated bone in the mastoid process. Pus pressed out. Wound lightly dressed, not packed. Two hours later, a light dressing applied and Cg. hyp. started. XI, 26. Dressings slightly soaked. Ear tampon dry. XI, 27. T.  $38.4^{\circ}$ , due to premature closure of wound and retention. Wound opened. Pus swells up. Pus in external canal. XI, 30. T. normal for several days. No discharge. XII, 2. Wound closed. No retention. Slight œdema over mastoid. No tenderness. XII, 10. Normal conditions. XII, 23. Discharged. Cured. Treated four weeks.

CASE 6.—Aged ten months. Child has been ailing for some time. Three weeks ago, slight purulent discharge, A. D., increasing in the last few days. With fever. X, 24, '04. S. P.: Fœtid discharge, evidently old, A. D. Drum red and bulging. Small perforation below mastoid red and swollen, tender and fluctuating. Cg. hyp. 22 hours daily. X, 27. Child stands constriction well. Œdema of mastoid more marked. Inflammatory redness less. Tenderness almost gone. The abscess has become cold, but as it has not decreased in size, an incision is made 1 cm long, letting out a large amount of thick pus. Mastoid process and neighboring portion of the squama bared of periosteum, discolored, grayish-white; no fistulæ. Pus expressed. Wound lightly dressed. 2 hours later, Cg. hyp. Canal wiped out daily. X, 28. Dressing soaked. Some oozing of sero-pus on pressure. T. normal. X, 30. Discharge much less. No odor. Oozing on pressure now of clear serous fluid. T. now  $39.2^{\circ}$  in P. M. Coryza and epiphora. No symptoms of intracranial complication. Measles developed and was complicated by bronchopneumonia, in spite of which the Cg. hyp. was kept up for twelve hours daily. XI, 28. Discharged. Cured. Treatment four weeks.

CASES 7, 8, 9, 10.—Purulent otitis media of a few weeks' standing, with evidence of mastoid involvement. Incision of abscess in several instances. All cured after three to four weeks.

B.—CHRONIC CASES.

CASE 1.—Aged seventeen. Mastoid operation some time ago. Relapse of mastoid pain. VI, 27, '05. Swelling and redness

over right mastoid. No fluctuation. Tenderness marked. Cg. hyp. six hours daily. VII, 18. Mastoid now normal, no abscess having developed. No tenderness. Discharged. Cured.

CASE 2.—Aged sixteen. Purulent discharge, A. D., at times from early childhood, constant since several months ago. III, 9. '05. S. P.: A. D., canal filled with foul-smelling pus. Large polyp hanging from upper wall, hides drum. No mastoid changes. T. normal. Cg. hyp. 22 hours daily. Canal wiped out daily. III, 15. Discharge less. Polyp about half original size. Drum visible. Site of perforation can not be made out. Canal walls very red and swollen. IV, 3. No further change in polyp, which is snared off. A few drops of pus in the canal. IV, 17. Practically no pus discharge. No swelling of wall. Small granulation at site of polyp. Touched with chromic acid. Discharged. Cured.

CASE 3.—Aged three. Discharge, A. D., since infancy. Pain, redness, and swelling behind ear since a few days. VIII, 16, '04. Profuse discharge of foul gray pus, A. D. Painful and tender fluctuating area, red and swollen, behind ear. Large polyp hiding drum. T. 39.4°. Cg. hyp. twelve hours daily. VIII, 18, '04. Fluctuating swelling now covered by normal skin (cold abscess). No tenderness. T. normal. Incision, 2cm long over swelling, frees a large amount of foetid pus. Mastoid bare of periosteum. Bone discolored, grayish-white. No fistulæ. Dressed. Two hours later, Cg. hyp. XIII, 25. Discharge, always slight, now stopped. Wound closed. No pus on pressure. No tenderness. Less discharge from canal. Streptococci found in smears and cultures of the secretion. VIII, 27. Wound cicatrized. Slight secretion from canal. Patient taken home. In Jan. 5, 1906. S. P. shows the polyp much shrunken. Drum shows a large perforation taking up almost the entire pars tensa. Pus still discharging from tympanic cavity. No signs of mastoid disease.

CASE 4.—Age one and a half years. Discharge, A. S., since one year. Painful swelling behind ear since a few days. VIII, 4. Profuse foetid discharge, A. S. Canal wall and drum red and swollen. Site of perforation can not be made out. Post-auricular redness and swelling, fluctuating and tender. Incision 1cm long. Free escape of thick pus. Rest pressed out. Dressing, two hours later. Cg. hyp. twelve hours daily. III, 10. Wound closed. Soft tissues appear normal. Fluctuation gone. No pus on pressure. Discharge from ear less. Child sent to out-patient dept. XII, '04. S. P.: large perforation in anterior segment

of drum. Discharge now more copious. G. C. bad. No evidence of mastoid involvement.

CASE 5.—Aged eighteen. Profuse discharge, A. D., for three months. Painful swelling behind ear in last few days. V, 7, '04. P. X. Canal, A. D., filled with foetid pus. Intense redness and swelling of wall completely hiding drum. Post-auricular region cedematous and inflamed. Fluctuation near the auricle. Intense tenderness. T 39°. Incision, 1m long in abscess. Free discharge. Bone found denuded over a large area. Wound expressed and covered with a sterile dressing. Cg. hyp. twelve hours daily. VI, 1, '05. Swelling behind ear almost gone. Fistula discharging pus at site of incision. Probe meets rough bone. Discharge from canal has been wiped away daily and is less. VI, 8. Condition about same. Mastoid operation. Extensive cholesteatoma. Radical exenteration. Cure.

CASE 6.—Aged fifteen. Pus discharge, A. S., since infancy. Lately, after influenza, intense pain left side of head. A. D. radical operation some years ago. I, 21, '05. A. S. Thick pus running from canal. Upper wall so red and swollen that drum cannot be seen. Edema and inflammation over antrum. No fluctuation. Inflamed area hot and tender. T. 38°. Cg. hyp. 20 hours. I. 30. At first the inflammatory symptoms retrogressed, but since a day or two there is increasing evidence of mastoid abscess formation. Incision, hardly 1cm. long. Large amount of bloody pus evacuated. Probe reaches a large cavity in the bone. Constriction kept up. Drum found to be almost completely destroyed. Epidermization and granulating areas seen in the tympanic cavity. IV, 8. No improvement to date under Cg. hyp. Mastoid opened, and found full of cholesteatomatous masses. Large cavity. Bone in this region remarkably soft spongy, and vascular. Radical operation. Stacke flap. Packed and sutured. Discharged. Cured.

CASES 7, 8, 9, 10.—Chronic purulent otitis, or acute exacerbations with evident mastoid involvement of several months to one year's standing. Cg. hyp. of no avail. Radical operation in three cases followed by cure. Death from double lobar pneumonia in the fourth, after about six weeks under Bier's treatment without any improvement in aural condition.

The case-histories reported above afford further proof of the excellent results to be obtained with Bier's treatment.

As in the case of the extremities, the more acute the inflammation the more successful the treatment. Of our cases of acute mastoiditis every one was cured, and all were cases which had been referred to us for the usual operation, and presented without exception the classical symptoms indicating surgical interference.

Any one who has had much experience with mastoid operations knows how variable the anatomic and pathologic conditions are which he finds on opening the process. In a case in which all the symptoms point toward an abscess in the mastoid no pus at all may be found, and again fistulæ and sequestra are found where swelling of the soft parts was the only indication of bone disease. Considering these difficulties in the pathologic diagnosis, we are not justified in drawing conclusions from external conditions as to the changes within the mastoid cortex. In our cases, this would lead only to vague conjectures, as in the majority of cases the incision was so minute as to reveal practically nothing of the surface of the bone. A careful study of the case-histories will certainly impress the reader with the fact that the most varied conditions and degrees of inflammation were included in our series.

A word must be said in regard to the small incisions which were used in a number of cases. Years ago a similar cut, the Wilde incision was extremely popular, but in the course of time this simple procedure has practically been abandoned by aural surgeons, or is used at best in an occasional case of doubtful nature. Koerner doubts whether acute bone suppuration can ever be reached by the Wilde incision. It may possibly be of use in mastoiditis in infants, but here we do not necessarily have to deal with bone suppuration; on the contrary, in the majority of cases there is an empyema of the antrum which may break through a patent mastoideo-squamous fissure and simulate bone disease. In such cases Wilde's incision merely takes the place of spontaneous perforation through the skin, and, like nature's method, may lead to recovery. In the cases of reported cure in adults, Koerner claims that there was not sufficient proof of actual bone disease. There may have been merely an exudation,

capable of resorption, in healthy bone cells, and it is by no means out of the question that even grosser errors of diagnosis were made, in which subcutaneous abscess, periostitis, or broken-down lymph glands in furunculosis of the external canal wall were mistaken for mastoid suppuration. Still it must be admitted that other authors have observed healing of marked mastoid abscess after Wilde's incision, although these are very exceptional cases, which according to Politzer prove only that purulent bone affections in the mastoid process may under certain circumstances heal without operation. They prove nothing as to the healing effect of the incision.

After all, our small incisions can hardly be likened to the Wilde incision, which is a rather large cut intended to act primarily by abstraction of blood,—an indication which was not generally met by our simple puncture. The main object was merely to prevent a spreading of the suppuration and to evacuate the pus, as is done in similar osteomyelitic abscess of the extremities in the course of Bier's treatment. This view of the action of the small incision suggests the determining effect of the hyperæmization which is proven positively by our results in those cases of undoubted mastoiditis in which absolutely no other treatment whatever was used. The results of the congestive treatment in the chronic cases were not exactly brilliant, and cannot be compared for a moment with the results in the acute cases, yet even here a careful analysis will throw a rather different light on our failures. If dead bone has already been sequestered, or cholesteatoma is present, nothing can be accomplished with congestive hyperæmia. This undeniable fact excludes three of our chronic cases (5, 6, and 7) in a critique of the procedure. These cases were only treated because an exact diagnosis had not been made. Still, of seven chronic cases, only two were cured. Of these, one was a relapsing mastoiditis subsequent to operation. It is difficult to say what conditions were present here, so that the case does not offer much of a basis of criticism. The other case was one of chronic purulent otitis with formation of a polyp, after the removal of which a cure soon took place under congestive

hyperæmia, but this case, too, does not prove much, as spontaneous healing of aural discharge occasionally takes place after the removal of such growths. The uncomplicated middle-ear suppurations offer no criterion, as they, too, often get well, without any operative interference whatever, under ordinary local asepsis. The crucial question is whether we can cure chronic mastoiditis by Bier's method. In that event we shall certainly be able to count on a spontaneous cessation of the remaining, uncomplicated discharge from the ear. Cases 3 and 4 seem to speak in favor of this possibility. These were both decidedly chronic cases which came under observation with mastoid abscess. The latter were treated exactly as in acute cases and were rapidly cured. It is to be regretted that the children were taken home before the residual otitis had completely ceased, but repeated careful examinations by a specialist long after showed that there was no trace of the old mastoid affection. All that remained was a discharge from the middle ear, and this uncomplicated suppuration could undoubtedly have been cured without any operative procedures. Unfortunately these cases were lost to observation. Cases 7 and 8 may serve to uphold this view, but in one there were reasons why the congestion treatment could not be kept up, while in the other the previous history pointed to cholesteatoma, and indicated an early operation. The condition of the bone as found on opening the mastoid is worthy of notice. It appeared extremely vascular, owing to the continued hyperæmia, and in most cases, particularly in cholesteatoma, there was a noticeable and sharp limitation of the diseased tissues. The after-treatment seemed to be decidedly shortened by the previous Bier constriction.

All in all, the results in chronic mastoiditis are hardly encouraging, and it is a question whether we should advise further trials of the procedure in this particular field. Experience in chronic osteomyelitis of the extremities indicates that there may be certain cases of chronic mastoid disease which will be benefited—those in which there is no sequestrum, but an abscess or granulating cavity.

A warm recommendation of the procedure in cases of

acute mastoiditis is only natural in view of the excellent results obtained by us in the first series of ten cases. Others will undoubtedly obtain as good results with the method, and accomplish what has so far been possible only with the use of hammer and chisel.

## SIMPLE AND RADICAL MASTOID OPERATIONS UNDER LOCAL ANÆSTHESIA.

BY DR. HEINRICH NEUMANN, VIENNA.

Abridged Translation, by Dr. M. J. BALLIN, New York, from *Zeitschr. f. Ohrenhkk.*, Vol. LI., 1906, German Edition of these ARCHIVES.

SCHLEICH, in 1894, stated that the mastoid operation could be readily performed under local anæsthesia, unless sclerosis and eburnation of the mastoid cells were marked. This method has since been tried with varying success by many operators. Hoffman, of Dresden, at the Fifth Congress of the German Otological Society, reported that he had used Schleich's anæsthesia in a number of cases of operation on the mastoid process, but that he had again abandoned this method because working with the chisel and bone forceps was found to be unpleasant to his patients. In a patient who was apparently of a nervous temperament, headache lasting several days and attacks of dizziness were observed after the operation.

In 1897 Noack (*Münchener medizin. Wochenschr.*, p. 135) published his experience with the Schleich local anæsthesia. He states: "Contrary to Schleich's expectations, I found in several operations on the mastoid process that the infiltration alone was not sufficient, as I was not able to bring about anæsthesia in the deeper layers of the bone, and had, when working in the tympanic cavity, to resort to the use of chloroform. I hardly believe that this method can prove entirely satisfactory in cases in which there is an extensive diseased condition, as there are areas supplied by nerves which are not reached by the infiltration of the periosteum."

Braun<sup>1</sup> reports that he operated upon frontal and maxillary sinuses under Schleich's local anæsthesia.

Friedländer<sup>2</sup> confirms the statements of Schleich, that the periosteum of the long bones can be made œdematous and anæsthetic with surprising ease, whereby the entire bone becomes anæsthetized. If the marrow is also made insensible by infiltration through a small trephine opening in the bone, one is able to saw, chisel, and break off compact as well as spongy bone without any pain to the patient.

In 1901 a report was published from our clinic. My colleague, Dr. Alexander, performed eleven cases of mastoiditis under Schleich's local anæsthesia. A number of these cases showed surprisingly good results, as the analgesia was almost complete. In other cases, while working in the deeper parts, especially in scraping out the antrum, an occasional pain was experienced, which immediately necessitated another infiltration. In all eleven cases, however, the operation could be finished under local anæsthesia, and the cases were discharged from the clinic as cured.

Alexander also tried to perform the radical operation under Schleich's anæsthesia, and operated upon two cases by this method. In his report, however, he states that this method is inadequate, as it was not possible to detach the posterior wall of the external meatus or to work in the tympanic cavity without causing pain.

In addition to the infiltration anæsthesia, Schleich recommended the use of the ethyl-chloride spray as a local anæsthetic in the opening of the mastoid process in the acute cases. Scheibe, of Munich, reported at the Fifth Congress of the German Otological Society (*Arch. f. Ohrenheilk.*, vol. xli., p. 72) that he had operated upon six cases with this form of anæsthesia. It is, however, necessary for the success of the method that the sensitiveness on pressure over the mastoid process be not too marked. His suggestion was not followed.

Thies, of Leipzig (*Arch. f. Ohrenheilk.*, vol xli., p. 73), used

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<sup>1</sup> "Über Infiltrationsanaesthesie und regionäre Kokainanaesthesie," *Centralblatt für Chirurgie*, 1897, No. 17, p. 482.

<sup>2</sup> "Erfahrungen über die Lokalanaesthesie nach Schleich." *Wiener klin. Wochenschr.*, 1900.

a 1 per cent. solution of cocain. He injected this into the soft parts of the mastoid process of a girl eight years of age. The incision in the skin and bone was somewhat painful; the opening up and scraping out of the bone and the removal of considerable granulations and pus were carried out to the end without causing much annoyance to the patient. How long Paul Reclus (*L'anæsthésie localisé par la cocaine*, Paris, 1903) has used the injection of a 1 per cent. solution in operating on the mastoid process I could not learn from the literature. Reclus carries out his method in such a way that he first anæsthetizes the skin by intracutaneous injections, and then injects subperiosteally, or makes subperiosteal injections before the incision in the skin. He waits about five minutes after making the injection; it is not stated whether, in his case, the antrum is opened.

Through the introduction of adrenalin, the action and use of cocain have been greatly enhanced. After cocain and adrenalin had been used in combination by many operators, and found to be of value, the paper of Braun<sup>1</sup> appeared, in which he is the first to recommend and establish the use of this mixture. He showed that the impaired vitality of the tissue increases the local action of the poison. This impaired vitality may be obtained by an interruption in the circulation of the blood from constriction, by diminution of temperature, and finally by the local application of adrenalin. Simultaneously with the increased local action of the poison the general action diminishes as its absorption becomes less rapid.

Braun showed that cocain and adrenalin injections into the tissue anæsthetize beyond the zone of direct infiltration, and at the same time the effect of the cocain lasts much longer. The statements of Braun were confirmed by the experiments of A. Exner<sup>2</sup> and Sörms.<sup>3</sup> The latter showed that the

<sup>1</sup> "Über Einfluss der Vitalität der Gewebe auf örtliche und allgemeine Giftwirkung lokalanaesthesierender Mittel und über die Bedeutung des Adrenalins für die Lokalanästhesie," *v. Langenbeck's Arch.*, lxi., Nos. 1 and 2.

<sup>2</sup> "Über die durch intraperitoneale Adrenalin-injectionen verursachte Verzögerung der Resorption von in den Magen eingeführten Giften," *Arch. f. experimentelle Pathologie und Pharmak.*, vol. I., p. 313.

<sup>3</sup> "Experimentelle Untersuchungen über die Gefässwirkung von Suprarenin in Verbindung mit örtlich anaesthesierenden Mitteln," *Deutsche Zeitschr. f. Chirurgie*, lxxiv., p. 63.

contracting action of the suprarenin on the blood-vessels is affected the least by cocain, while it is somewhat reduced by eucain and tropacocain.

On March 5, 1905, a paper by Heidenhain<sup>1</sup> appeared, which induced us to undertake our experiments. Heidenhain demonstrated that 1cc of a  $\frac{1}{2}$  to 1 per cent. solution of cocain to which 1-2 drops of a 0.1 per cent. solution of adrenalin had been added, would in the course of half an hour anæsthetize the cutis, subcutis, and fascia, which would last several hours. A 1 per cent. solution was better than a  $\frac{1}{2}$  per cent., acted quicker, and extended over a larger area. If this solution was injected beneath the scalp on the bone, within half an hour not only the scalp but also the underlying bone became totally insensitive to pain down to the dura, and apparently this also.

He performed two trephining operations without pain by injecting 10cc of a  $\frac{1}{2}$  per cent. solution of cocain to which adrenalin had been added. When using cocain he follows the directions laid down by Reclus. One can in this way, according to the statements of Reclus, use cocain up to 20cg without producing toxic symptoms. We shall return to a consideration of these directions, which I also follow very closely, later on.

Heidenhain regrets (p. 252) that he has recently had no case arising from the middle ear, and says: "In all probability it may become feasible to carry out the radical operation in chronic, and perhaps even in some acute, cases with Braun's local anæsthesia to the utter satisfaction of the physician and patient, by which I mean to say that the physician may work unconcerned and undisturbed, and the patient will not complain of pain. The very fact that the field of operation is so limited allows the hope to use less of the fluid, and therefore to employ the stronger and more powerfully-acting 1 per cent. solution of cocain."

At the meeting of the Austrian Otological Society held on April 25, 1904, I was able to present a case in which I

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<sup>1</sup> "Trepanation unter Lokalanæsthesie und Trennung der Galea ohne Blutung," *Zentralblatt für Chirurgie*, p 249.

opened up the mastoid process under complete anæsthesia according to the suggestions laid down by Heidenhain, by subperiosteal injection of a mixture of a 1 per cent. solution of cocain and adrenalin.

Since that time I have employed this method in a large number of acute cases, and Professor Politzer and Dr. Alexander have also operated a large number of cases in this manner. By the combination of subperiosteal injection in the external meatus (see my paper on "Hammer Ambos-Extraktion in Lokalanæsthesie," *A. f. O.*, vol. lxiv), I was able to carry out the radical operation under local anæsthesia without any pain, and there have been up to now about forty radical mastoid operations performed by this method.

I have also opened up maxillary and frontal sinuses by this method without causing any pain.

To determine the action of subperiosteal injections, I undertook a number of experiments on animals (rabbits) in which I injected into the periosteum of the frontal sinus the above-mentioned mixture, to which I added a few drops of gentian-violet, to give it a deep violet color. Upon opening the frontal sinus, it could be seen that the injection had really taken place subperiosteally. The entire surface of the periosteum next to the bone was of a deep violet color, the cuticle layer of the bone was also of a slight violet tinge, and as I opened the frontal sinus I could clearly see the violet color in the blood-vessels of the mucous membrane. In like manner I have also convinced myself in the radical operation on the human ear in vivo that the interior of the mastoid becomes tinged through the subperiosteal injection. This injection acts in such a way that a portion of the fluid finds its way into the interior of the mastoid process through the bony canals and lymphatics, where it passes along the nerves and blood-vessels behind the mucosa and anæsthetizes this as well as the bone.

I will confine myself, as otologist, to the description of the exact technic of injection for operative procedures on the ear, such as the simple and the radical mastoid operation. The technic of the operation on the frontal and

maxillary sinuses is so simple that after reading this paper any one can readily do it himself.

**Indications for anæsthesia in the operation for acute mastoiditis.**

Only such cases are suitable for local anæsthesia in which there is no subperiosteal abscess. In those cases in which such an abscess exists, sufficient pressure in the abscess cavity can not be obtained to permit absorption of the fluid into the interior of the mastoid process, and the fluid would again escape through the opening made by the needle.

With the exception of these cases just mentioned, we regard local anæsthesia as contraindicated only in very nervous individuals; on the other hand, we recommend it most earnestly in all cases of weak, non-compensated hearts, in advanced pulmonary tuberculosis, in acute affections of the lungs, diabetes, nephritis, and in short in all cases in which general narcosis is contraindicated.

In all other cases the operation under local anæsthesia is just as good as that under general anæsthesia, and we make it a rule, in cases in which there are no fixed indications for or against local anæsthesia, to allow the patient to decide for himself. We found that usually when there is one patient in the ward, who has been operated upon under local anæsthesia, a number of other patients would then decide to allow themselves to be operated upon in the same manner, while it happened less often that patients preferred the local to the general anæsthesia, without the example and the encouragement of other patients.

**Preparation of the patient; technic of the injection and operation.**

According to the instructions of Reclus, one must lay special stress upon the fact that the patient takes a hearty meal before the operation. Experience shows that no toxic symptoms will then arise, even if doses as high as 20cg, without the admixture of adrenalin, have been given. After the patient has been shaved and disinfected, he is covered with sterilized cloths, as is usually done in such operations; the physician who gives the injection disinfects himself in the usual manner after he has prepared the solution. We

used at first 0.05-0.06 cocain to which we added 3-4 drops of tonogen<sup>1</sup> per cc, making in all 18-24 drops. We noticed that we had almost an entire absence of blood and the operation gave the appearance as though working upon a cadaver, but while waiting for the injection to take effect toxic symptoms appeared in a number of the patients, which we attributed, according to the investigations of Braun, to tonogen. Some of the patients complained of quite severe headache immediately after the injection, especially in the region of the sagittal suture and in the forehead; the action of the heart became accelerated and often irregular, as well as the beat and tension of the pulse. There was a feeling of constriction over the chest, and nausea, and the patients became pale. The symptoms never became so serious that artificial means had to be resorted to. The patients received an abundance of black coffee so that the toxic symptoms began to subside before the operation was begun and always disappeared entirely by the time the incision was made in the skin. Sometimes these toxic symptoms are not at all pleasant to the physician and patient. We therefore no longer aim to get a complete absence of blood, and are satisfied with the anæsthetic action alone, as we find a diminution in the hemorrhage, even if we use much less tonogen, namely 10-15 drops in all. Our mixture consisted therefore of 0.05-0.06 cocain in solution to which 10-15 drops of tonogen were added. With this mixture we have never observed toxic symptoms. 0.05-0.06 cocain amounts to about 5-6 syringefuls. It has been found advantageous, however, to inject 8-10 Pravaz syringefuls. In a large number of cases we have added to this solution 3-4cc normal salt solution, so that our mixture for injection now consisted of 5cc of a 1 per cent. cocain solution + 12 drops of adrenalin + 3cc of normal salt solution. This mixture must not be boiled, but must be merely warmed to body temperature before injection, according to the suggestion of Braun.

The injections are made in the line of incision, usually

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<sup>1</sup> It may be mentioned here that we have used all the suprarenal preparations in the market (adrenalin, suprarenin, tonogen, etc.).

three in number (one at the upper end of the auricle, another at about the centre, and the third at the mastoid tip), and two along the anterior surface of the mastoid process. It is best to inject first at that place at which one wishes first to incise and chisel. We have never found it necessary first to anæsthetize the skin where the injections are made. Even the most sensitive patients readily stood the slight pain produced by the injection.

We use for injection a metal syringe made by Reiner, which can be sterilized and is provided with a strong needle. The point of the needle must be introduced at an angle to the bone, and as soon as one feels the bone, push the needle slightly forward and then inject. That the injection has been successful is shown by the fact that the fluid enters with great difficulty and no swelling arises, with the exception that we get a slight bulging of the soft parts owing to the subcutaneous injection which always accompanies the subperiosteal injection.

The periosteal injection is readily carried out, when the periosteum is only loosely attached to the bone—that is, over the planum mastoideum and backward towards the occipital bone, and on the anterior surface of the mastoid process. The injection is much more difficult when the periosteum is very adherent to the bone, as at the tip of the mastoid process. At this place one must pierce the periosteum by pushing the needle here and there, in order to at least infiltrate the periosteum with the fluid even if the subperiosteal injection is not successful. With a little practice it is possible to obtain a complete anæsthesia also at the tip of the mastoid process.

The injections of the anterior surface of the mastoid process are also of special importance. If these are not carried out, the patient suffers excruciating pain, especially if there is caries of the posterior wall of the meatus. The injection is made in such a manner that we introduce the needle behind the ear at the line of attachment of the auricle, parallel to the posterior wall of the meatus (*i. e.*, the anterior surface of the mastoid process). At the end of 10–15 minutes one can proceed with the operation. The technic does not vary from

that in any other mastoid operation, with the exception that one does not, especially at the beginning, pull too forcibly on the periosteum and does not chisel away too large pieces of bone in order to avoid physical shock. This does not cause the patient any pain, but he feels a pressure on the other ear upon which he is lying, and gets thereby a false impression of the extent of the operation. While hammering one must always put a small pillow under the head of the patient. One of the physicians or a nurse should constantly converse with the patient, in order to get his mind off the operation. This succeeded so well in a number of cases that some of the patients laughed and joked, while others smoked cigarettes and cigars during the operation. After the operation the patients often feel so well that they insist upon walking out of the operating room, which we allow on account of the impression which it makes upon the other patients. We have never experienced any post-operative hemorrhage or necrosis as a result of the tonogen. Ligatures are only seldom used. They are replaced by a compression bandage. We have never observed any unpleasant sequelæ after the operation.

*Radical Operation.*—In order to carry out the radical operation without pain, it is necessary to combine the injection method employed in opening up the mastoid process as given above with the method of injection which I have devised for the extraction of the hammer and incus. In the radical operation we need 12–14cc of the mixture. We combine 7–8cc of a 1 per cent. cocain solution, 15 drops of adrenalin, and 5–6cc of a normal salt solution. According to the experience of Reclus, who injects 15–19cg of cocain before introducing the adrenalin, and Schlemmer (*Vierteljahr. f. Zahnheilk.*, xxi., Jan. 1905), who injects 0.48 cocain in the course of three hours, one may be able to use even larger doses of cocain without getting any toxic symptoms. We got along very well, however, with the doses as given above. The order of injection must be carried out in such a way that the injection is made last at that place at which we operate the latest—that is, the injection in the external meatus is made only after the injections in the mastoid pro-

cess have been completed. The injections in the mastoid are performed in the same manner as in the operations in the acute cases. One must again lay special attention to the tip and anterior surface of the mastoid process. Great care must be taken not to perforate the posterior wall of the external meatus and not to inject into the meatus instead of into the anterior surface of the mastoid.

Having finished this injection, we next inject four syringefuls of the mixture—that is, one syringeful in each of the four walls of the meatus, at the place of union of the cartilaginous and bony parts. This local anæsthesia is not applicable to those cases in which the posterior superior wall of the meatus has been considerably raised up from the underlying tissues, owing to suppuration and the formation of cholesteatoma. In such cases the pressure which aids absorption is again wanting. The fluid escapes immediately after the injection and does not produce the desired anæsthesia. Total destruction of the tympanic membrane is, on the other hand, no contraindication.

Having made the injection one needs to wait only ten minutes, or if the injection into the external meatus has taken a longer time, we may begin even immediately with the opening up of the mastoid process, as the injection into the meatus will have produced the desired anæsthesia by the time we reach the antrum and tympanic cavity.

Dr. Alexander and myself have up to the present performed twenty radical operations under local anæsthesia, and are very much satisfied with this method. In a few of the cases there was, to be sure, a slight pain now and then, due to our technic, which was not as yet fully developed, but in the course of time we learned how to overcome such small errors, so that we are now able to carry out the entire radical operation without the least pain. The incision in the skin and in the periosteum, as well as removal of same, and the separation of the membranous meatus, are absolutely painless. The curetting out of the tympanic cavity and antrum, the extraction of the ossicles, and the plastic operation, are also all carried out without pain. Up to the present time there is one part which we have not as yet been able to

anæsthetize, in spite of the fact that we have placed a cotton plug soaked in a 20 per cent. solution of cocain in the tympanic cavity in addition to injection, and that is the Eustachian tube. It seems that it is not possible to obtain a sufficient analgesia at this point with the method given above. The curetting of the tube, is, however, a procedure of such short duration, which one can very well do at the end of the entire operation, that one need not for this reason hesitate to carry out the operation under local anæsthesia. The duration of the operation and anæsthesia lasted, in some cases, an hour and a quarter. None of the operations took a longer time. Working on the bloodless bone hastens the operation, which is, on the other hand, retarded in proportion through consideration for our patients. We have, as a rule, ligated only the inferior auricular artery. Post-operative hemorrhages as well as other unpleasant sequelæ we have never observed. Also during the performance of these operations, the patients were allowed to smoke; they conversed, joked, and laughed, and only seldom complained of the unpleasant concussion caused by the chiselling, which, however, was not really pain. It is only when removing the cortical layer that pain in the teeth is sometimes experienced, which, however, is overcome or lessened by firmly closing the jaws, and is then, as a rule, felt only to a slight degree.

The detailed history of twenty cases, ten acute cases, in which merely the mastoid was opened up, and ten in which the radical operation was performed, follows (see German original).

## ON DISTURBANCES OF SPEECH IN CHILDHOOD.

BY DR. VICTOR HAMMERSCHLAG, VIENNA.

Translation from *Zeitschr. f. Ohrenhkl.*, Vol. XLV., 1903, German Edition  
of these ARCHIVES.

THE following is a report of a case of disturbance of speech in a child which presented a number of points of interest.

E. W., born on December 22, 1898, was brought to me by her mother with the statement that the child does not talk, although the hearing is apparently normal. The family history is as follows:

The little girl, now five and a half years old, comes of entirely healthy parents, of whom both are alive. The grandparents on both sides were also healthy, and attained a rather advanced age. There have been no consanguineous marriages. The mother has given birth to four children, all of whom are now entirely healthy.

The personal history of the child is as follows: The birth was normal; the child developed normally in the first year. At the age of fourteen months it could walk and articulate several words like "Mamma," "Tata," "Papa," and seemed to have a perfectly normal hearing. It then was taken ill with convulsions. The first convulsive seizure set in while the child was in perfect health, and lasted for three hours. The seizures were repeated for several days. During this time there was a rise of temperature. A measles eruption appeared, which followed a mild course. After eight or ten days the convulsive seizures ceased. The entire illness, up to the onset of convalescence, was sixteen weeks. The mother states that after the first seizure the arms and legs of the child were as if paralyzed. The child lay quietly

in bed, and was unable to move the limbs. Furthermore, the rudiments of speech were lost after the first attack. The hearing, however, was as good as before, as the child re-acted upon being called by not only moving its entire head, but also by rotating the eyes. During convalescence the child could not walk, and had to be again carried. After one year a number of syllables again could be pronounced, such as "Papa," Mamma." In the third year it slowly relearned to walk and to run. As regards speech, no further progress was made. The child had only acquired a few additional words. Otherwise the child is entirely healthy, understands every word which is addressed to her, goes on errands, executes commissions, plays with her sisters and brothers. On examination, a well-nourished child. The skull is slightly rachitic, and the cranial nerves are unaffected.

Examination of the extremities shows no abnormality. The motor power is normal. There are no contractures. Reflexes not increased.

Examination of the internal organs also negative. Examination of the ear showed that the vowels *a*, *i*, and *u* could be heard when spoken in low conversational voice at a distance of at least 10 mm. All of the Hartmann tuning-fork series (c-c<sup>3</sup>) were perceived on both sides up to the point of dying out.

Repeated examinations of the intelligence showed that the child followed all orders, though with some hesitation. It closes the door, carries a book, sits on the floor, raises the right and the left arm, closes the eyes, shows the tongue, recognizes a number of objects. It studies pictures with pleasure and with comprehension; distinguishes between the ordinary domestic animals. It, however, does not distinguish colors nor understand figures. This shows that the intelligence of the child is surely quite good, though this test does not suffice to determine whether the child is psychically and intellectually entirely normal. Rather unusual is a certain lack of attention and an unusual confidence to strangers.

There seems to be no question that this is a case of motor aphasia, though it is difficult to decide whether this condition is congenital or one acquired in early childhood. If it is a congenital condition it must be classed in the clinical picture described by Coën as hearing-mutism or alalia idiopathica. Coën (*Pathologie und Therapie der Sprach-anomalien*,

Wien u. Leipzig, 1886) describes the clinical picture as follows: "A child, usually of good healthy external appearance, with well developed bodily constitution and normal mental development, is conducted to the physician with the statement that notwithstanding its advanced age (4-10 years) it has never learned to talk. The child appears well, understanding everything, follows all orders, enjoys excellent health, but cannot enunciate any articulate speech." These statements of Coën's must be supplemented by the observation that some of these children can spontaneously possess a small amount of speech, usually "Mamma," "Papa," "Tata." Coën continues: "On the closest examination of these patients, there is no external condition which can be brought into connection with the defect. The intelligence and the hearing in these individuals are well developed and apparently in good functional order." Though Coën considers hearing-mutism as usually a congenital inability to produce articulate sounds, it seems probable that he is inclined to regard this trouble as a congenital affection. In another place he says: "As a cause for this defect a traumatic or psychic effect on the youthful organism is accepted. In all of these cases it can with certainty be determined that shortly before an acute pathologic process has taken place which can be followed by the loss of speech. I have found in a large number of these cases that the hearing-mute children come of families in which a similar or a closely allied defect in speech was present, which was due to a retarded or rudimentary development of certain organs. These arrested developments occur in children whose parents have presented the same anomaly in their youth or show some defect with lack of resistance or weakness. Moreover, consanguineous marriages, just as in deafmutism, seem to augment the anomaly of development which causes the hearing-mutism."

Subsequently the clinical description of the disease—hearing-deafness—has been adopted by Alt and Treitel.

These authors have endeavored to show that hearing-mutism as well as the psychic deafness of Heller are only symptoms of idiotic mutism.

Leaving this question undecided, we must insist that we

regard hearing-mutism as a congenital lesion depending upon a cerebral disturbance and not identical with the acquired aphasias of childhood.

In this regard the following points in our case are of interest. Against the theory of congenital disease, we found an absence of every hereditary taint as well as the presence of a number of completely normal older brothers and sisters. It should again be repeated that there was no consanguineous marriage in the family. Positive proof for a congenital anomaly of development is not present, while the statements of an unusually attentive and intelligent mother speak for the possibility of an acquired aphasia. It can be taken for granted that the power of walking was completely lost after the convulsive seizures. The question remains whether aphasias can occur in the course of acute febrile infectious diseases in childhood. This possibility is suggested by a number of observations. Aphasias, as well as paralysis and paresis of the extremities, belong to the not unusual complications of typhoid fever, scarlet fever, whooping-cough, diphtheria, pneumonia, and finally measles.

Bohn reported on 6 cases of aphasia which he had observed himself after typhoid fever in children. In one case the aphasia was associated with a right-sided hemiparesis. In all of these cases the aphasia disappeared after a relatively short time, usually in the course of one week. To explain this condition the author assumes a structural or circulatory disturbance in the speech area of the cerebrum. The post-typhoid aphasias give apparently the most favorable prognosis. They are usually isolated. The aphasias occurring after scarlet fever do not generally give a bad prognosis even in those cases where they are combined with a hemiplegia and where an organic lesion of the brain seemed to be present. On the other hand, the aphasia after scarlet fever seems to remain for a long time. Finlayson observed a hemiparesis and marked disturbance of speech in a boy after a year and a half. In the well-known case of Eulenburg-Bernhardt-Sander, of a boy eight years of age, which showed a very unfavorable course, after two months hemiparesis and almost complete aphasia still existed. The hemiparesis was

present five years later, while the aphasia had disappeared. The mental functions of the boy had suffered severely. The autopsy, which occurred eleven years later, revealed an atrophy of the left cerebral hemisphere. I have found four cases described in literature of aphasia occurring after measles:

1. Case of Schepers. ("A Case of Nervous Affection in Measles," *Berl. klin. Wochenschrift*, 1872, p. 517.)

A girl eight years of age was taken ill with measles. Four days later her condition grew very much worse and the child became comatose. On waking from her coma three days later, she was completely aphasic. The sensorium is free; the understanding for speech is preserved. The hearing is normal; the legs are paralyzed. There is ataxia of the upper extremities. The author believes that an acute hydrocephalus was present. In the subsequent course a relatively rapid and complete recovery took place. After ten days the child was able to enunciate the vowels, some consonants, and several words, and it could stand upright for several minutes. Gradually the speech and the power to walk returned.

This case is somewhat similar to ours because motor disturbances of all the extremities were present. The disturbance of speech, however, in this case was of a more transient nature.

2. Case of Schwarz. ("A case of aphasia with simultaneous paralysis of the extensors of the right upper extremity after measles," *Deutsches Arch. für klin. Medicin*, xx., Bd., 1877, p. 615.)

A child three years of age, feeble though never previously ill, and of good intelligence, suffered from measles and high fever. On the onset of convalescence 18 days after the beginning of the disease the child became aphasic and motor disturbances in the right upper extremity became apparent. Subsequently complete gradual recovery took place. The aphasia disappeared exactly in the way in which the child had originally learned to talk.

3. Case of Calmeil. ("Inflammatory Disease of the Brain." Quoted by Moeller, *Archiv f. Kinderhklde.*, 1897, vol. xxi., p. 297.)

A healthy boy after measles suffered from severe convulsions with continuous coma, from which he woke deaf, blind, and dumb. Fourteen days later the hearing returned. One year later he was able to speak a few words. He, however, remained blind and became epileptic and hemiplegic on the right side. Up to the 13th year idiotic. He died when twenty-two years old. On autopsy probable sclerosis and atrophy of the entire left hemisphere as the result of the encephalitic processes which were caused by the measles infection.

4. Case of Möller. ("On the Statistics of the Epidemic of Measles," *Arch. f. Kinderhklde.*, vol. xxi., 1897, p. 297.)

A case of amnesic aphasia in a girl five years of age who had passed through an uncomplicated but exceedingly febrile attack of measles. After this illness the child had lost all power of speech except for a few words. She understood all questions; answered by gestures. In the course of the next weeks she gradually relearned to speak and after a few months the speech was entirely normal.

These cases show that disturbances of speech occurring after acute infectious diseases, especially measles, are usually of a transitory nature. Our case, which is apparently an exception, resembles principally the case of Calmeil previously quoted, and the case of Eulenburg.

The prognosis depends upon the form and intensity of the anatomic changes in the brain associated with the original disease. The anatomical material does not suffice to gauge the disturbances of hearing occurring after infections. For these transitory forms of aphasia some authors assume a rapidly transient œdema of the brain. Bohn speaks of disturbances of the circulation. Heinemann does not think that in these transitory aphasias gross lesions of the central organs can possibly be present. In the cases, however, in which the hemiplegia is combined with the aphasia an organic disturbance in the brain substance must be assumed to be present. Calmeil believes that in his case of unhealed aphasia an encephalitic process was present with sclerosis and atrophy of the left cerebral hemisphere. It seems most probable that in our case a number of encephalitic foci were present.

## ON OBJECTIVE TINNITUS.

BY DR. C. FRIEDMANN.

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CASES of objective tinnitus are rarely found in literature; hence the report of the following case seems justified.

The patient, a girl nine years of age, has complained of peculiar noises in both ears for several weeks, which are also appreciated by the mother of the child. There are no subjective symptoms. Two years ago the girl had suffered from appendicitis, and had been ill for twenty-nine weeks. This was followed by a paralysis of the lower extremities, apparently due to a spinal meningitis with gradual complete recovery.

The patient at present suffers from general nervous symptoms, with occasional convulsive movements of the lower eyelids and of the muscles of the chin. The right pupil is somewhat larger than the left. The left eye shows a slight paresis of the left internal rectus muscle. The cardiac sounds are normal, pulse 117.

At a short distance from either ear of the child, and more distinctly on placing the ear on that of the child, a rhythmic uniform noise is heard of a crepitant character, which occurs from time to time and disappears without known reason. The frequency of the noise is 100-120 per minute. It is not synchronous with the pulse. There are no movements to be observed in the drum. Occasionally contraction of the soft palate synchronous with the noise can be observed. The convulsions in the muscles of the lower jaw appear also to be synchronous with the noise. Hearing is normal.

The child is apparently very nervous and is extremely fearful. Hence a thorough examination cannot be performed, a post-

rhinoscopic examination could not be undertaken and treatment could not be followed.

The diagnosis was made of a chronic spasm of the tensor veli muscle on both sides. During the three weeks in which we observed the patient no change occurred. As the noise was not simultaneous with the pulse it can be accepted that it was not a vascular bruit. It therefore must be a muscular noise. The muscular noises have been divided by authors into two groups, those originating in the intrinsic muscles of the tympanum, the so-called entotic murmurs, and those depending upon the tubal muscles, the so-called tubal noises.

It was formerly believed that all these noises depended upon a contraction of the tensor tympani muscle, until Politzer in 1862 showed that this peculiar crepitation could be produced by a separation of the anterior from the posterior wall of the tube. He also observed a synchronous associated movement of the soft palate. It has since then been discovered that the noises are caused by the tensor muscle of the soft palate. Cases have been examined post-rhinoscopically where this separation of the tubal lips was observed synchronously with the noise. Cases in which the spasmodic contraction of the tensor tympani has produced this crepitation and associated movements of the drum or at least a variation in the air pressure in the external auditory canal have been observed.

Kaiser believes this noise to be a muscular tone depending upon the contraction of the tensor tympani muscle, similarly as the cardiac tone is due to the contracture of the heart muscle. Brieger, however, believes that the muscle is altogether too delicate to produce so intense a noise. Others have thought the noise was the result of the friction of the ossicles or the vibration of the drum membrane. As the character of the noise is always the same, Brieger believes that it is always produced by the same cause, namely, the opening of the tube, though he is not certain whether this is produced directly by the tensor tympani or by means of a synergic action of the tensor veli, which has the same nerve supply. Troeltsch has shown that contraction of the tensor veli can cause this noise.

From other observations and from the cases which have been cited, it seems that this is not an isolated action of the tensor tympani, but that there are other muscles in this neighborhood which are active. Cases have also been reported in which the noises have been referred with certainty to a simultaneous irritation of the tensor tympani and of the tensor veli. Brieger has reported one of these cases, in which a manometric variation of temperature was observed in the external auditory canal simultaneous with the noise, and a fluid reflex could be observed in the tubal opening of the pharynx. After division of the tendon of the tensor tympani the noise was arrested for a short time, but then was louder than ever and distinct spasms of the soft palate could be observed. The variations in pressure in the external canal had ceased. After sixteen days the movement of the soft palate became less marked, the noise became louder, the variations of pressure again were present. The tendon evidently had reunited, and both muscles were responsible for producing the noise. It seems, therefore, that an affection of the tensor veli muscle must be assumed, and that the tensor tympani is not involved in those cases where the drum shows no movement.

In the cases of this kind which have been reported, a peculiar disappearance and reappearance of the symptoms was noticeable. In some these symptoms could be voluntarily influenced by the patient, though in no case was it possible to permanently arrest the noise. Moreover, it seems possible for healthy persons to produce a similar noise.

As regards the cause, in most of the cases the patients have been nervous after a general illness or one of the ear. As every one agrees that the disease depends upon nervousness and hysteria, the treatment must be an appropriate one.

## REPORT OF FOUR FATAL CASES AFTER PURULENT OTITIS.

By DR. HOELSCHER, ULM.

Translated from the *Zeitschr. f. Ohrenhkk.*, Vol. XLV., 1903, German  
Edition of these ARCHIVES.

THE following four cases of purulent otitis which terminated fatally are of interest both from a clinical standpoint and from the autopsy findings.

CASE I.—K.M., twenty-four years of age, consulted me on March 7, 1903, on account of pain in the left ear. Three weeks later he returned stating that the ear had discharged for 8 days. Paracentesis was performed. There was headache in the right half of the head, the auditory canal was filled with pus and there was a small perforation down and back. There were no mastoid symptoms. Whisper was heard in 4m.

Another paracentesis was made. This was followed by a more profuse discharge. Headache continued. The pain was most marked at the supraorbital foramen. The mastoid process was free from symptoms.

On the following day, after a very bad night, the bone directly above the auricle was tender. There were typical severe attacks of supraorbital neuralgia. The point of greatest tenderness was directly at the supraorbital foramen. Operation was advised, but, as the general condition improved somewhat, the patient preferred to wait until one week later, when he had passed another very poor night.

Operation revealed the mastoid cortex hard and sclerosed. On removing the bone in the region of the upper auditory canal wall, a large quantity of yellowish pus suddenly escaped. The probe entered into a large cavity in the middle cranial fossa. A large part of the squama was then removed. The bone was

found partly softened. The dura of the middle cranial fossa was covered with thick granulations which were removed with a curette. There were no fistulæ to be seen in the dura, and, viewing from above, there was no fistula entering the tympanum. The mastoid process was found normal. The pus contained pneumococci.

During the next few days the patient was free from pain and fever, until, one week after the operation, he experienced very severe pain in the distribution of the left trigeminal nerve during the night. Pulse 84, regular. Sensorium somewhat affected. Pain over the supraorbital and infraorbital foramina, and the entire temporal region was tender. On changing the dressing the wound looked well.

On the following day the sensorium was again normal. The patient stated that he was crazy yesterday but felt much better to-day. He called all objects "nerves." He was able to correctly describe objects and denote their use, and took nourishment well. Examination of the eye-grounds negative. No headache.

On the following day the brain was punctured without striking any pus. The patient's condition did not improve. His temperature remained at about  $38.3^{\circ}$ , pulse 74. Almost constant stupor and headache alternating with delirium. He gradually grew weaker. Difficulty of speech. He became so noisy that he had to be isolated, and on April 28th died.

*Autopsy.*—During the removal of the brain a large quantity of thin, fluid pus escaped from the incision in the dura. On removing the dura, the brain is softened, and in the posterior cranial fossa and in the vertebral canal there is a large quantity of thin pus. The anterior and lower half of the cerebellum, the pons, and the corpora quadrigemina are softened and covered with a greenish membrane. On the posterior surface of the petrous bone to the inner side of the sigmoid sinus there is a necrotic area  $1\text{cm}$  in diameter in the dura. The sinus is normal. In the left middle cranial fossa the dura is separated from the petrous bone and the bone is rough. There is no pus between the bone and the dura. The dura is only moderately thickened.

In the roof of the 4th ventricle there is a purulent exudate. The 3d and 4th ventricles contain a purulent fluid. An abscess cavity measuring  $9\text{cm}$  by  $4\frac{1}{2}\text{cm}$  is situated at the medial side of the left temporal and occipital lobes. A puncture canal

is still recognizable and extends directly to the abscess membrane. On the roof of the tympanum there is a very small fistula. The surrounding bone is carious.

*Remarks.*—This otitis, apparently beginning as a usual one, must have quickly led to disease of the tympanic roof and then to the formation of an extradural abscess, which in turn produced the abscess in the temporal lobe. The very profuse suppuration was due to the extradural abscess, the pus escaping through the fistula in the tympanic roof. The absence of mastoid empyema is interesting. The neuralgia of the 5th nerve was apparently the result of the brain abscess.

The continuous one-sided headache, the tenderness on pressure, and the exceptionally profuse suppuration suggested the presence of an extradural abscess in the middle cranial fossa. This condition was also found at operation, and the amount of pus was so large that it seemed sufficient to account for all the symptoms, and during the next six days the patient was practically free from symptoms. Then the neuralgia returned and the sensorium became disturbed. Puncture of the brain was negative. His condition then rapidly grew worse. The extremities became cold; there was difficulty of speech. On the following days the patient became so delirious that he resembled very much more a maniac than a sick person. The path of infection in the production of a temporal lobe abscess was not found at autopsy as no fistula was revealed in the dura and the dura on its inner surface appeared normal. The extension to the posterior cranial fossa was, however, very distinct. The extradural abscess had extended posteriorly to the petrous pyramid, then downwards between the sigmoid sinus and the internal auditory meatus, where the dura became necrotic and an entrance was made under the posterior cranial fossa.

CASE 2.—S., twenty-two years of age.

The patient was taken ill with nose-bleed and chill. To this were added headache and pain in the chest. After three or four days these symptoms all disappeared except the headache. On

the following day there was a slight inflammation of the throat. Two days later the pain was more severe, especially in the occiput, and the right ear began to discharge. On that night the nose-bleed was repeated and there was a severe chill. The right auditory canal contained foetid pus. Temperature,  $39.4^{\circ}$ . The patient states that he had frequently previously suffered from earache and discharge from the ear, with swelling behind the ear. On admission there was thick pus in the right auditory canal. The drum revealed a large perforation occupying almost the entire posterior half. No œdema over the mastoid process. Some pain above and behind the insertion of the auricle. On percussion the right half of the head is very painful, especially over the transverse sinus. No rigidity of the neck. Some tenderness along the jugular vein. Nystagmus on looking to the left. Severe vertigo on standing. Pulse 110, full and strong. Weber to the affected side. Hearing almost lost. The operation revealed pus and granulations in the antrum, attic, and tympanum. A cavity extended directly backwards from the attic which contained a sequestrum as large as a pea embedded in granulations. After cleaning out this cavity no fistula was to be found. The surrounding bone appeared healthy. The hammer was fairly normal. The incus could not be found.

For the next few days the general condition was much better, although there was some serous discharge from the left ear. A little over two weeks later the patient began to complain of very severe headache. The appearance of the wound was normal. Pupils reacted promptly. No tenderness on percussing the skull. The urine contained some albumen. The headache continued on the following days, and was most marked over the forehead. There were no other symptoms. During the night there were occasional convulsive seizures of the entire body. The headache continued and was so severe that the patient could not sleep. The convulsions more frequent. The patient became stuporous, with distended abdomen. Pulse full. The right pupil was more dilated than the left. On the night of March 29th, after numerous convulsive attacks and disturbances of respiration, the patient died.

*Autopsy.*—The dura was normal. On removing the brain two teaspoonfuls of yellowish pus were removed from the base of the brain, and a large quantity escaped from the vertebral canal. The brain at the base, and especially along the blood-vessels and

at the site of the nerves, is covered with tough purulent exudates. These membranes extend to the posterior surface of the cerebellum and into the Sylvian fossa. The occipital and temporal lobes are adherent. All the ventricles are distended with a clouded serous fluid. The choroid plexus on both sides is clouded and thickened. The markings of the cerebellum on section are indistinct. The white mass of the brain presents numerous small hemorrhages on section. There is no abscess. The dura is firmly united to the bone at the base of the skull and there are no fistulæ or purulent infiltrations. The sinuses are all normal. The diagnosis was cerebro-spinal purulent leptomeningitis with internal hydrocephalus.

*Remarks.*—The patient was taken ill without known cause. The disease was recognized as grip, though the symptoms of this affection disappeared, except that the headache and fever returned with pain in the occiput and discharge from the right ear. The presence of tenderness over the transverse sinus and the jugular bulb suggested a sinus trouble but at operation there was no reason to suspect this, as there was no fistula or carious area of bone leading to the sinus. Operation was followed by a number of days of comparative improvement. The headache then returned with an evening rise of temperature. This was followed by the onset of chronic convulsions which involved the entire body, at first mild and at long intervals, later with greater frequency. The patient became unconscious. The clinical course of the autopsy makes it evident that the beginning trouble was not this attack of grip, but the onset of the meningitis. A lumbar puncture at that time might have given us some definite information. The case then was an uncomplicated one of otitic meningitis with protracted course. It is curious that there never was any rigidity of neck, nor any other symptoms beyond the headache, fever, and constipation. It was not possible at autopsy to find the path of infection. It probably started from the region of the sequestrum.

CASE 3.—B., twenty-one years of age.

On March 6, 1903, the patient had taken cold. He complained of pain in the chest, and had some fever. The condition improved, but on March 28th he returned on account of deafness.

Four days later there was some rise of temperature, and the throat was inflamed. The patient had previously never suffered from his ears. The ears began to discharge on the night of the 3d of April. The right auditory canal contained a serous hemorrhagic fluid. The canal was very tortuous. The drum was reddened; perforation was not visible. In the left ear there was a recent perforation down and in front. Hearing diminished in both.

*April 6th.*—Tonsillitis is very much diminished. There is headache and tenderness over the left mastoid process. The suppuration is profuse. On admission the left auditory canal contained a great quantity of pus. The drum was grayish, with desquamated epithelium. There was a perforation down and back. The mastoid incisure was tender. There was no œdema on the right side. There was a perforation down and back. The mastoid process was normal. The patient complained of pain in the left half of the head and vertigo. During the last five nights he had not been able to sleep. On the following day the condition had not practically changed, except that the hearing had diminished very much. The vertigo had increased, and there was some nystagmus on looking to the left. The tenderness over the mastoid on the left side had increased.

During the following night the patient was somewhat stuporous, with occasional delirium. There were slight convulsive seizures. The pulse was weak, 120–130. There were no inflammatory signs over the mastoid process, though the bone was tender on pressure. Operation was decided upon.

On removing the cortex, with the first blow of the chisel a dirty, grayish membrane was presented, which proved to be the anterior wall of the sinus. The bone intervening between the auditory canal and the sinus was not more than 2mm thick. This thin plate of bone is a dark dirty brown. The mastoid tip is prominent, and contains a number of large cells filled with pus. The tip and most of the posterior wall were then removed. The sigmoid sinus was exposed from the upper knee downwards. The entire sinus wall was a dirty gray, and the sinus does not pulsate. Puncture with a sharp knife at the upper knee was followed by the appearance of a weak stream of dark blood, which ceased immediately. The cutaneous incision was prolonged downwards along the anterior margin of the sterno-mastoid muscle. A green cylindrical body as large as a small finger was exposed, doubly

ligated, and divided. The pulse had grown so much weaker during the operation that stimulation was necessary. In the course of the day the stupor seemed to be less. Towards evening the patient became restless and delirious. In the night the pulse became weak. Death ensued.

*Autopsy.*—The dura appears normal. The longitudinal sinus contained fluid blood. On incising the dura yellowish pus appeared at the posterior part of the left temporal lobe. The upper side is infiltrated with pus.

The convolutions in the convexity of the brain are flattened. The brain mass itself on section reveals no abnormality. The base of the brain does not show any purulent exudate. The cerebellum is soft and friable. The ventricles contain some clouded fluid. The transverse sinus on both sides contains fluid blood. The left sigmoid sinus shows in the region of its upper knee a tenacious purulent clot attached to the outer surface, which consists of fibrin threads and pus cells. The jugular bulb and the other sinuses appear as fluid blood. There is no pus in the right mastoid process.

The pericardium contained some clouded blood.

The diagnosis is thrombo-phlebitis of the left sigmoid sinus after purulent otitis. Beginning meningitis over the left temporal lobe.

The cause of death: Heart failure from septic pyæmia.

*Remarks.*—The first symptom on the part of the ear was deafness. Subsequently there was fever with tonsillitis. The otitis, therefore, preceded the tonsillitis. The mastoid process was free. The mastoid incisure was tender. Tenderness over the mastoid incisura, with high fever and purulent otitis, signifies a sinus affection. The symptoms, however, were not so distinct as to make the diagnosis certain. On the following day the symptoms of a sinus affection were more pronounced. The patient became delirious, and there were slight chronic convulsions. With poor heart action, the outlook for operation was not favorable. It was nevertheless undertaken. At operation the sinus was found unequally displaced forward and diseased for a long stretch. Puncture showed an obturating thrombus. The jugular vein was therefore to be ligated before the sinus was opened. The vein could not be found, and the operation was not

completed, because the patient's condition became too weak.

The disease of the sinus in this case was the result of the direct contact of the sinus wall with the diseased bone. The small circumscribed meningitis joined the diseased transverse sinus. Perforation of the walls had not taken place. It is interesting to note that there had never been any chills.

CASE 4.—K., twenty-one years of age.

The patient was taken ill with severe pain in the limbs and in the head, especially in the throat and in the left ear, with a purulent discharge from the latter. He was unable to stand, was stuporous and delirious. Pulse 99. Temperature 40.4°.

General physical examination revealed no abnormality. The pharyngeal mucous membrane was very red, and in the left ear the drum was red, and the tympanum contained pus which discharged drops of pus through a very small opening.

These symptoms of the type of an influenza gradually were transformed to those of a septicopyæmia, possibly originating from a middle-ear suppuration. There was irregular temperature (37.6° to 40.5°). The pulse rate was rapid (90 to 120), the pulse was weak and soft. There apparently was no meningitis. The dorsum of both feet, especially the right one, were very much swollen and reddened. On the external surface of the right foot there was a large bleb containing bloody fluid. All the joints were tender. The stupor and delirium were associated with attacks of extreme weakness.

The patient died, and the following conditions were found at autopsy:

The dura normal. The pia transparent, somewhat clouded over the convexity. The brain is normal. The dura at the base of the brain in an area corresponding to the left transverse sinus is lack-lustre and greenish-yellow. The sinus contains a thrombus extending into the jugular foramen. On the side towards the petrous bone there is a collection of thick yellowish pus where the dura is necrotic and roughened bone exposed. The tympanum and the mastoid process contain yellowish pus. The left drum is defective.

*Remarks.*—The severe and rapid course of this case re-

sembles the preceding. An operation performed at the proper time would probably have saved the patient's life, because the disease of the sinus is usually caries of the posterior wall of the petrous bone, with necrosis of the dura and of the anterior wall of the sinus. Neither a paracentesis nor a mastoid operation was performed. The symptomatic treatment in these cases is equivalent to no treatment at all. The course was absolutely typical.

## REPORT OF THE TRANSACTIONS OF THE SECTION ON OTOTOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

REGULAR MEETING, APRIL 12, 1906, DR. GRUENING IN THE CHAIR.

### **Presentation of patients.**

Dr. HARRIS said that he presented this patient in order to afford the members an opportunity to examine her, and asked that they would give their opinions concerning the conditions present and the methods of treatment to be pursued. The girl, seventeen years of age, was attacked about five weeks ago with an involvement of all the accessory sinuses of the nose on both sides, and suffered excruciating pain in the frontal sinus. Turbinectomy was performed on the left side to assist drainage, and the maxillary antrum was opened also. Three days later, as the result of carelessness and undue exposure on the part of the patient, she was seized with pain in the right ear, accompanied by discharge. This was soon complicated by mastoid pain over the antrum and tip. The discharge continued, but in order to secure better drainage a paracentesis was performed. At the height of the attack some sinking of the posterior-superior wall was observed. There was some leucocytosis, and a polymorphonuclear percentage of 64. The infection was streptococcic. The discharge gradually lessened and ceased two or three days ago. The pain over the mastoid antrum and tip disappeared about that time, but up to the present there has been distinct mastoid pain over the posterior portion of the mastoid process, though only on two or three occasions has there been any complaint, but always pain upon deep pressure. Another interesting point in the history, which had only been elicited to-day, is that four years ago the patient had suppuration from both ears and suffered occasional pain in this region without suppuration. There is no tempera-

ture, pulse under 120, the patient eats and sleeps well and has a good color.

Dr. MYLES said that the case presents some rather peculiar features, especially in regard to the lymphatic gland, which was as large as any that he had ever seen in that place. There was evidently a sepsis in that region which was being held in the gland. This was not a common occurrence, though we frequently see small glands there from chronic disease of the meatus, but it seldom happens in these acute processes.

Dr. BRYANT presented a case of **modified radical operation** in a case of recurrent otitis media purulenta with good hearing in the intervals. During the last attack, mastoiditis had developed. The operation revealed a condition which demanded complete exenteration of the mastoid with all its connecting cells, especially those lying in the zygoma and epitympanum. The technique of the operation was planned to give the maximum of drainage without destroying the ossicular articulations, with the intention of retaining a maximum of hearing.

The noteworthy points in the operation were that the posterior meatal wall was removed to the annulus tympanicus which was left intact; the posterior fan-shaped ligaments of the incus and the posterior articulation of the ossicles were not injured; the zygomatic cells and epitympanic space were thoroughly opened by the removal of the posterior and middle root of the zygoma and the hanging meatal wall. At the same time the upper part of the annulus was carefully preserved intact and the attachment of the superior ligament of the malleus was not touched nor the external ligament interfered with. The special points in the result of the operation were the extremely rapid convalescence and the restoration of hearing to what is the normal for the other ear.

The patient, a young man seventeen years old, was operated on last August at the New York Eye and Ear Infirmary. By pain, swelling, and tenderness, the present attack gave signs of mastoiditis lasting six weeks. When first seen the temperature was 100.4° F. There was extensive swelling above and behind the auricle, tenderness over the mastoid region, and purulent discharge from the meatus.

The operation was commenced by an extensive "U" cut in the membrane. The mastoid process and cells were removed. During the course of the operation the dura mater was exposed over the knee of the sinus and the tegmen tympani. The smear

from the mastoid pus showed a mixed infection. The aural pus showed diplococci. The wound was closed without packing.

On the first day, the temperature was normal. On the second day, the packing was taken from the canal. On the third day, the patient was up and dressed. There was no discharge from the ear. Nearly all of the post-aural wound healed by first intention. On the fifth day, the fundus of the canal was nearly dry. On the eighth day, the patient went home. On the tenth day, the membrana tympani was healed and closed, the fundus of the meatus was dry, and the post-aural wound healed, except at one point. On the eleventh day, all the wound was scabbed over and healed. On the fifteenth day, the post-aural was epidermatized. On the sixteenth day, the watch was heard at thirteen inches. One hundred and thirty-five days after the operation, the watch was heard forty-six inches by the operated ear, and fifty inches by the normal ear. There has been no pain nor discomfort of any kind in or about the ear since the operation. The meatus looks normal and the membrana tympani nearly so. The post-aural surface is smooth with a linear cicatrix. The mastoid process has been renewed and is nearly the counterpart of its fellow.

Dr. HELD said that the case appeared to be one of resolving mastoiditis, with disease still existing in the posterior cells. The general contour of the mastoid would seem to indicate this. He had seen similar cases. As a rule, the disease in the antrum resolves first. Should the mastoid bone be opened, which is not indicated in this case, a semi-solid serum would probably be found, and the result of the recent infection is probably affecting the cervical gland which is so much enlarged. He thought that with conservative treatment the case would right itself.

Dr. GRUENING said that he was much interested in the case and had seen a similar one during the afternoon, a woman who had suffered from an otitis media. She has had no symptoms of otitis for the last two weeks, but her hearing was now normal. She came in with a temperature of 105°, chill, and a swelling of the right knee. She was thoroughly examined by the internes and they could find nothing but the enlarged knee. As the ear had been the only organ affected, it was supposed that there must be a sinus thrombosis, although the ear at present showed no symptoms of disease, no tenderness anywhere. Twice in the last year the medical men at the hospital made a diagnosis of this kind by exclusion. There was no discharge, but the patients

came in with a history of chills and vomiting, and other symptoms pointing to sinus thrombosis, but absolutely nothing else beyond the fact that, two or three or perhaps four weeks before, there had been some ear disease. In both of these cases Dr. Gruening had been called upon to open the sinus, and in both found the thrombosis as diagnosed by the medical men. He thought that this case should be watched with a great deal of attention, and that the temperature should be taken two or three times a day.

**Report of a case with hysterical symptoms upon which the radical mastoid operation was performed, with blood clot.** By W. S. BRYANT, M.D.

The patient, a woman, forty years of age, had suffered from purulent otitis on the left side all her life. She had excruciating headaches, and, periodically, temperature and some dizziness. On April 21st a radical operation was performed, and the bone opened with the Bryant gouge. The knee of the sigmoid sinus was found far forward, the bone between it and the meatus measuring not more than 2mm in thickness. The dura mater was pushed back and the posterior wall of the meatus removed, in order to get at the antrum, which was found to be filled with cancellated and hard bone, leaving only the aditus open. All the bone encountered was sclerosed, and there were no diploë or cells. The mastoid tegmen was wanting, and granulation tissue was found in the vault of the tympanum. The dura appeared thick, but not discolored. There was some carious bone on the inner wall of the tympanum. The wound was closed without packing. The meatus was lightly packed.

On the 23d, the temperature was 100°, which was the highest reached. The patient complained of severe headache. The wound was infected, although the skin over the mastoid had healed by first intention. On the 27th of April the posterior wound broke down. On May 1st it was closed again. On May 16th the middle ear was perfectly dry, and the scar behind was barely visible. The fearful headaches of which the patient had complained had ceased. On January 30th the acoumeter was heard twelve inches in the same ear. On August 28th she had frontal and occipital headache, relieved by adrenalin and cocaine on the middle turbinates, which were pressing on the septum. October 5th, removed a large cystic middle turbinate on the left side. November 9th, occipital pain on stooping. Palpation of the sphenoidal sinuses caused sharp and severe occipital pain.

November 11th, much headache and both sphenoids extremely tender. Patient says that she tastes foetid pus in the morning, and has some yellow expectoration. Temperature  $99.6^{\circ}$  at 6 P. M. November 21st, on account of the great sensitiveness of the sphenoids, occipital pain, slight rise of temperature, and reported discharge of pus, both sphenoids were opened through the nose, under ether. They appeared to be normal. December 17th, interior of the nose well and no longer sensitive. January 5th, patient complains of choking swelling in the throat, especially at night, dyspnœa, and dysphagia. On inspection nothing abnormal found. The trachea and enlarged cervical glands were sensitive on palpation. January 15th, patient complains of lump in the throat like a marble, sometimes on one side and sometimes on the other, which bothers her a great deal, interferes with breathing, and is painful. No longer complains of headache.

The convalescence of the patient after the radical operation showed what might be expected in case a wound is infected when the blood-clot method is used. The convalescence was somewhat retarded, but the results appear to be practically as good as though no infection had taken place. The patient had had some objective symptoms of suppuration, inflammation, and swelling, and some signs of what appeared to be hyperæsthesia of the mucosa of the upper air tract, with painful reflexes, mingled with hysterical symptoms. The case shows how important it is to guard against misinterpretation of hyperæsthesia, which may simulate more serious conditions. It seems very probable that the excruciating headaches of which the patient complained, and which were relieved by the radical operation, were hysterical.

**Report of a case of possible intracranial arterio-venous aneurism, or exophthalmic goitre.**

The patient, a woman of about twenty-five years of age, was first seen, in consultation, in 1904. The history, given by a surgeon, is, that fourteen months previous to that time an attempt had been made to tie her left cavernous sinus. At that time he said she had pulsating exophthalmos. A diagnosis of arterio-venous aneurism was made, in the neighborhood of the cavernous sinus. The operation had to be discontinued on account of the severe bleeding, but not until the finger had felt a pulsation at

the apex of the petrous bone. In December, 1903, both common carotids were tied, within ten days of each other.

The history, as given by the patient, is that the left ear had annoyed her for about ten years, first with pain, later with tinnitus. She had a mastoid operation at the time, in Russia. She has suffered from dizziness and facial paralysis on the left side of the face for about two years. The dizziness is sometimes like "black water" before the eyes, and she apparently loses consciousness. The pain is located chiefly back of the left ear.

*Physical Examination, July 13, 1904.*—Exophthalmos is quite marked in both eyes. Scar on the left temple and another over the left mastoid, also one on each side of the neck where the carotids were tied. There is a pulsating area measuring 2 by 4cm which can be seen behind the small pointed mastoid process. The visible pulsation extends down from the superior occipital curved line. The pulsation can be felt over a much larger area, as far as the spinous process of the fifth cervical vertebra. Pressure on the corresponding portion of the right side of the neck makes the tinnitus louder, patient says. Slight pulsation can be seen and felt in this area. Auscultation reveals a loud souffle over the pulsating area of the left side of the neck. On the right side the souffle is heard most markedly at the upper end of the right pulsating area, corresponding to the posterior end of the digastric fossa. Compression of the left external jugular with the finger diminishes the tinnitus but causes a large venous tumor to appear below the ear at the angle of the jaw, which perceptibly lifts the whole auricle. The arterial pulsations are strong and can be felt beneath the upper half of this vein, and a strong pulsating souffle is heard on auscultation, especially in the lower half of the neck. Auscultation of the ear reveals a pulsating souffle. The carotid sounds and pulsation were naturally very faint. Tympanic inspection shows the left tympanum obliterated, with some small compressible red tumors in front.

On the 17th of July the pulsating area had increased and could be seen extending from the angle of the jaw to the median line posteriorly from the border of the soft parts above and the trapezius posteriorly, down to the clavicle and in front of the median line. Pulsation over the left mastoid visible as high as 2cm above the meatus, and pulsating vein runs anteriorly along the inner border of the left clavicle, also on the right side of the sterno-clavicular notches. The souffle is heard about the left

clavicle and extends way up over the cranial bones. After the patient had rested and become composed for a few minutes, the pulsation and souffle diminished considerably. The souffle can be heard around the base of the skull as far as the right mastoid process. The heart sounds are heard as far as the upper border of the left clavicle. On the right side the souffle is heard in the superior-anterior triangle. Pressure on the right side increases the sound on the left. A vibration can be readily felt with the hand. Pressure on the pneumogastric slows and lessens the tinnitus. Left tonsil large and pulsating. Eye globes readily compressible. Lateral veins of the nose, temporal, frontal, and cheek veins large and prominent.

March, 1906. Complains of pain and dizziness in the head. Exophthalmos slight. Looks fairly well. Pain in the left side of the head and neck, which comes and goes. Pain has been worse the last two years. Pressure around the left mastoid tip stops the "buzzing." Left tonsil large. Auscultation shows occipital souffle loudest on left side. On March 20th, the symptoms are emphasized. Eight doses of 5-grain tablets of thyroid increased the symptoms beyond her moral endurance, which, together with the varying symptoms—sometimes better, sometimes worse—makes the case appear to be one of exophthalmic goitre rather than the earlier diagnosis, which was arterio-venous aneurism.

**a. Report of a case of brain abscess following traumatism and acute mastoiditis. Operation. Recovery.**

**b. Report of a case of hysteria simulating brain abscess after operation for secondary mastoiditis.** By ALFRED WIENER, M.D. (Published in full in this number.)

**Treatment of otitis media acuta and mastoiditis by artificially induced hyperæmia.** By S. J. KOPETZKY, M. D. (Published in full in this number.)

*Discussion.*—Dr. PHILLIPS said that he did not become easily enthusiastic over new methods of treatment, although he was glad to place his clinic at the disposal of those who were inclined to give such matters honest and thorough investigation. He had seen all of the cases which Dr. Kopetzky had been treating, and they were all undoubted cases of acute mastoiditis suitable for hospital treatment and gave indications that they might eventually require operation. It has been noted, however, that the

percentage of such cases which have cleared up without operation has been higher this winter than in past seasons. There were one or two interesting points in connection with this method of treatment that had impressed him very much. One was the very rapid and peculiar change in the character of the pus to a more watery condition. This took place in a short time after the application of the bandage. The prompt lowering of the temperature was another feature, although this frequently occurs after paracentesis and bed treatment. Another point was the relief of the pain. This, however, could also be claimed for a paracentesis and it was open to question whether the Bier method of treatment should receive all the credit of it, but the bandage undoubtedly relieved the pain immediately, and when removed the pain soon returned. The method, however was liable to do harm, and it should be used with great care and only by those experienced in the treatment of such cases. He did not think Dr. Kopetzky had sufficiently emphasized the fact that this method of treatment is contra-indicated when it is not promptly followed by a change in the character of the pus and lowering of temperature. The men who have written upon this subject have been more enthusiastic over it where there was an external periostitis with abscess formation. These cases they claim are almost universally cured by the Bier treatment. He himself was sceptical about this, but had just placed such a case with Dr. Kopetzky for treatment. The patient was a child about six years of age, with a large periostitis and a history of acute suppuration for three weeks. As there was already an opening through the external table and the child was not in immediate danger, it was considered suitable to try this method of treatment. A slight incision into the abscess was made and the bandage was applied, and the condition has subsided without a mastoid operation, though he was not yet confident that this might not be necessary later. He did not consider that the value of this method of treatment had been fully demonstrated, but it was only fair to give it a full trial. These experiments would be continued in his clinic for some time until they were thoroughly convinced in regard to it, and he hoped that others also would test its efficacy.

Dr. MYLES said that the subject was an exceedingly interesting one, and he was glad that Dr. Kopetzky had presented it before the Section. We are often impressed by the cause as well as the

cure of the conditions, pathologically probable, by the interference with the venous circulation, and whether it is due to an exosmotic current caused by pressure on the vein, and the escape of the serum from the venous circulation, or whether the serum is inimical to the bacteria, he did not feel able to say. In his experience, however, in studying the regions about the ear and in the different parts of the nose there are many contributing factors due to direct or indirect pressure upon the vein, not so much in the way of inflammation, but mechanically. He thought this method of procedure very dangerous for any one who was not extremely careful.

Dr. RAY (Louisville, Ky.) said that in his section of the country they were not so radical in their methods of treating acute suppurative cases of middle-ear disease as seems to be the practice in the Eastern cities, especially in hospital practice. In a very small percentage of cases was he called upon to do a mastoid operation for an acute suppurative process in the middle ear. He had often urged operation upon patients and had them refuse, and later see them get well without it. A prominent otologist in Louisville treats all such cases by the constant application of moist heat. He first makes a paracentesis and secures thorough drainage, has two nurses, if necessary, and maintains the constant application of moist heat. This treatment is kept up for two or three weeks, with the most satisfactory results. Dr. Ray has very seldom been called upon to open a mastoid in cases where he has had charge from the inception of the attack. The cases upon which he has operated were those which had been neglected and came to him with well-developed mastoid symptoms. Dr. Ray said he had seen one case where, as the result of long-continued hot applications, an external otitis had developed. He had been called in consultation to decide whether an operation was necessary, and had given his opinion that it was an external otitis from the long-continued hot applications. The pain later disappeared and the ear got well without operation.

Dr. BRANDEGEE said that he had been very much interested in the paper, but he did not see that it had been demonstrated that the cures were actually due to the Bier method of treatment. Here were six cases of acute involvement of the middle ear and mastoid. These cases were all of short duration, were well taken care of, and carefully watched. He did not know of any better treatment that could be given such cases. They were put to bed,

paracentesis performed, and hot chloride irrigation was maintained. There was no more rational way to treat an acute suppurative otitis media. The two-weeks-old case needed operation, but the other five cases were of extremely short duration and were promptly taken care of. Some cases do get well at times with local treatment. In most of the cases presented by the writer of the paper the most prominent symptom had been pain over the mastoid on pressure.

Dr. FRIDENBERG said that so far the reports in regard to the Bier treatment have been very enthusiastic, but it is well to bear in mind that disadvantages and ill effects are not published at first. It was only necessary to recall the history of morphoscopolamin anæsthesia. Keppler did not consider arteriosclerosis a counter-indication, yet it is undoubtedly a dangerous complication in a procedure which causes stasis. The possibility of cerebral hemorrhage must certainly be borne in mind, and in myopic eyes there is certainly danger of intraocular hemorrhage and of detachment. The Germans have recommended the Bier procedure, Dr. Fridenberg thought, without sufficient discrimination and without accurate indications as to dosage or discontinuance in cases of acute purulent otitis. Dr. Kopetzky's paper marks a distinct advance in that he lays down the valuable rule to give up constriction when the discharge does not promptly become serous, or when fever and pain continue. In regard to the cases he reported, it would seem that some of them were ordinary acute purulent otitis with the evidence of mastoid tenderness which is not uncommon in children. These cases generally get well with free paracentesis, especially if free drainage be assisted by evacuation of the tympanic cavity by suction—a method devoid of the dangers of Bier's treatment, but which has all the advantages of causing a free flow of fresh serum into the middle ear, assists drainage, and is not uncomfortable. It is to be noted in the cases reported by Dr. Kopetzky, in which there was evident prolapse of the postero-superior canal wall, operation became necessary. Dr. Fridenberg said that he wished to utter a word of warning as to the possible danger of Bier's treatment—the loss of time and the discomforts of constriction. It should certainly be applied, if at all, with the greatest caution. He disagreed absolutely with Keppler's statement that a new method should be applied promiscuously to as large a number of cases and variety of ailments as possible, even those which do not

seem to promise favorable results, in order to study effects and exclude the unsuitable cases. This method may be a good one in the laboratory, but it is out of place in the sick-room. On the contrary, the greatest care should be taken to apply a new method only where there is evident promise of success, and with clear indications. The welfare of the patient is of more importance than a rapid determination of the value of the method. The latter may proceed slowly but much more surely if it be applied scientifically and conservatively.

Dr. HARRIS said that he would like to add his testimony to what had already been said as to the great thoroughness with which Dr. Kopetzky had treated this subject, and the advantages which come from such careful investigation of any new method. There was much still to be desired in otological work, especially in the treatment of sinus thrombosis. The points which Dr. Brandegee had made could not be emphasized too strongly. Drs. Keppler and Kopetzky have failed to establish a control over their cases, and we are unable to decide how much of the favorable results are to be attributed to the method he has described and how much to the very excellent treatment accompanying it, in the form of rest, paracentesis, and hot douching. Another important point is the danger—not in the actual use of the bandage, but in the delay caused thereby. He had also been much interested in what had been said by several of the gentlemen in regard to the need of operation in all cases. Perhaps some of those present would recall a paper read by Dr. Pyle, about five years ago, in which he reported a series of cases of mastoiditis, which he followed up through the men who had referred the cases to him, all men of more or less prominence in the profession, and they stated that these cases, which were undoubtedly cases of mastoiditis, were well, and had been so for months and years without operation. The general opinion of the men who took part in the discussion at that time was that there was a great difference between the cases of mastoiditis in the country and those in the great hospitals of New York, and certainly they could not be expected to result in the same way. He much questioned whether it would be wise, as a routine measure, to say that we are justified in delaying operation in cases of acute mastoiditis showing well developed and characteristic symptoms. Those who see such cases on the operating table realize how often we get at them too late, and probably a delay of twenty-four hours

would endanger the patient's life. In the hands of such men as Dr. Kopetzky the patient would be safe, but the proceedings of the Section were read all over the country, and there was danger that others who were not so experienced or careful would endeavor to carry out this treatment with very evil results.

Dr. HELD agreed with Dr. Brandegee that Dr. Kopetzky's cases had received the most excellent care and attention, apart from the Bier method, and he thought that probably some of them would have recovered without the use of the bandage. He did not feel that the value of this method had been sufficiently demonstrated to be relied upon entirely to take the place of the ordinary accepted methods of treatment.

Dr. J. GUTMAN said that it was certainly difficult in such cases to decide whether the results were obtained *post* or *propter hoc*. He thought that the very best way to ascertain the real effect of the method would be to operate on a case and then apply the bandage, and note whether the wound healed more readily than is usual under ordinary treatment. He had not himself made this experiment, but had read of its being tried in certain diseases of the eye. So far as he could recall, however, no special effect had been noted.

Dr. GRUENING said that the last case which Dr. Kopetzky had mentioned would be of much value in deciding how much the results could be attributed to the Bier bandage and how much to the accompanying treatment. The relief of periostitis, which had been referred to, was rather an obscure question. This condition is not so common to-day as formerly, when the Wilde incision was much used. In retro-auricular abscess he generally found the bone very seriously diseased, but had not yet seen a case that was really a periosteal abscess.

Dr. KOPETZKY, in closing the discussion, said that he could not at the moment recall whether or not all of the cases reported seemed to demand immediate operation, but they were all severe cases, and in one of the private cases the instruments and assistants had been sent to the patient's house, but during the intervening time so great an improvement had been noted that operative measures were indefinitely postponed. Every one who does mastoid surgery is occasionally astonished on opening a mastoid to find therein a minimum amount of disturbance, and therefore it is very difficult to establish a satisfactory control. Dr. Harris regrets that no control was kept. An important question was—

How are we going to establish a control in studying this method? Take two ordinary cases of mastoiditis with the same symptoms, and one will clear up, while the other will not; or, in three cases, one will clear up without treatment, one will go on to operation, and one will clear up under dosage. What control have we to gauge the pathological changes going on in the mastoid? No absolute method exists for finding out the true condition present except by opening the mastoid, though we can be guided to a large extent by the clinical picture. Of the case still under observation, a child, pus was no longer evident in the wound, nothing but clear serum, and it was intended to remove the dressing the following day, and allow the wound to close up.

Regarding Dr. Brandegee's criticism that nothing had been demonstrated as resulting from the advocated method, but that the results obtained were ascribable to other excellent therapeutic measures undertaken, he holds that the evidence obtained from the rapid change in the clinical picture, the prompt dropping of the temperature, and the marked difference in the character and consistency of the ear-discharge were such that he is convinced these results are not alone due to excellent management of the cases, but to the influence of the induced hyperæmia, as no such results are observed in cases recovering under the usual methods of treatment. He calls attention furthermore to the remarkable shortness with which complete re-establishment of ear function is obtained as compared to results obtained in resolving cases, and therefore he must take issue with Dr. Brandegee, and say that while the results may have been aided by the other treatment given, a decided action directly attributable to the hyperæmia is evident. In the series of experiments he had limited himself to such cases as previous experiments had shown could be successfully treated by the Bier method. Chronic cases that have been opened after the application of the Bier bandage showed a sharp line of demarcation between the diseased and the healthy parts of the bone—a line almost like that in cases of gangrene. He had not tried the method on any chronic cases. There are extant other observations of the result of the method in throat and sinus cases; beneficial results from the application of the bandage are noted in these also. The method was absolutely dangerous in the hands of the inexperienced, and should not be attempted by such. The very fact that rapid changes have been observed indicates that something has been going on,

and this would naturally lead to the conclusion that if we are competent to observe the results of treatment of ear diseases, and we know that acute cases coming early under observation will almost invariably heal up when the Bier bandage is applied, then competent men should try the method; and he believed they would cure their cases more frequently with its aid than without it. One should not take sides on such questions, but should observe and study a subject broadly, and report results.

CLINICAL MEETING, MAY 10, 1906, DR. GRUENING IN THE  
CHAIR.

**Two cases of exsection of the lateral sinus and jugular vein.** T. PASSMORE BERENS, M.D.

T. O., age twenty-one. Admitted to the Manhattan Eye, Ear, and Throat Hospital, July 24, 1905. History of six or seven years of discharge from the right ear from unknown cause. For a week had been confined to bed with pain in and about the ear, with headaches, fever, and vomiting. Patient appeared extremely ill, with the typical appearance of sepsis. Temperature 102.5°. Mastoid tender on pressure; posterior superior canal wall bulging with a free foul-smelling discharge of pus exuding through a large perforation in Shrapnell's membrane; no tenderness or swelling in the neck; eye-grounds normal. Microscopic examination of a smear of pus from the ear showed a mixed infection. A Schwartze-Stacke radical operation was performed. During this operation a large extradural abscess was laid bare above the tegmen et antri, and communicated with the attic and antrum by a perforation through the bone. This abscess cavity was continuous with a perisinusitis of the sigmoid sinus, which was covered with granulations and was almost entirely collapsed; it contained pus which was walled off about an inch behind the knee by a partially organized clot, while below a similar clot extended into the bulb. The jugular was tied below the facial, and exsected after tying the latter. It contained no clot, but much difficulty was experienced in securing drainage through the bulb. The wound in the neck was treated after the open method, it and the mastoid being packed with iodoform gauze. The external walls of the sigmoid sinus and an inch of the lateral sinus were removed, after the posterior plug was inserted. The case made an uneventful recovery, excepting that he has refused a

plastic operation on the soft parts, and there is still an occasional discharge from the Eustachian tube. A study of the temperature chart is interesting in that it shows an extreme elevation of only  $101.5^{\circ}$ . This may be accounted for in one of two ways: either that the case was seen and operated upon during a remission, or that the circulation was so completely cut off by the organized clot as to prevent absorption of sufficient septic material to cause a higher temperature.

W. C., aged fifteen. Admitted to the Manhattan Eye, Ear, and Throat Hospital, February 10, 1906. The left ear had been discharging since infancy, probably from scarlet fever. Had had pain and tenderness in the mastoid for four days, and had had considerable malaise and some chilliness. Temperature  $98^{\circ}$ ; free discharge of foul pus through a large perforation, and bare bone was present in the attic. Patient was confined to bed. The next day, after some chilliness, the temperature rose to  $102^{\circ}$  and a radical Schwartze-Stacke operation was performed. The antrum was large and contained much foul pus; the mastoid was sclerosed throughout excepting in its extreme depth, *i. e.*, on a level with the floor of the antrum, where a series of communicating cells with necrosing walls was found lying against the inner table and communicating with the antrum above and the sinus below near the bulb. The sinus was seen at this point to be discolored a deep greenish hue; its further exposure revealed a perisinuous abscess, but the sinus except at the one discolored spot was not far from normal in appearance, excepting for a whitish mottling. The sinus was unusually large and very tortuous. It was incised and great difficulty was experienced in controlling the hemorrhage—indeed this was so free that normal saline solution was administered intravenously and the operation was discontinued. The patient rallied, however, and when the temperature reached  $104^{\circ}$  next day, the jugular was tied below the facial and the external walls of the sigmoid sinus were removed to about an inch and a half behind the knee. No clot was found. The pathological report on the portions of the sinus walls and the jugular was: "Many small areas of necrosis are present." The case was one of mixed infection. He made an uneventful recovery, and while the wound is not entirely dermatized, still he is attending to his work. The particular interest in this case is that there was a distinct phlebitis of the sinus present, without visible clot formation.

The two cases illustrate rather extremes in this class of cases, and for this reason were presented.

*Discussion:* Dr. GRUENING said that the most interesting point was that there was a thrombosis with a temperature of  $101^{\circ}$ . That is unusual. Of course it may have been an uninfected thrombosis. The sigmoid was opened and no clot was found. Dr. Gruening thought that this was not infrequently the case and had performed the operation three times this winter without finding a clot. The wall of the sinus, however, showed that the sinus was diseased. Some one has said that when the incision is made the clot and thrombosis are manufactured, and then the jugular is exsected. This is certainly not so. Another interesting feature in Dr. Berens's cases was that he tied the jugular in both instances below the facial. Dr. Arnold Knapp read a paper before the Section during the winter, stating that the jugular should be tied above the facial. It would be well to have a discussion of the reasons for this difference of procedure.

Dr. RICHARDS, referring to the statement that we should as a practice ligate the jugular vein above the point of entrance of the facial to save the facial as a compensatory avenue in order to avoid the dangers arising from faulty venous return flow, said that he regarded this as an extremely dangerous procedure. It is not in accordance with what the pathological findings in these exsected jugular veins teach us. Serious circulatory disturbances following total jugular resection are very rare. He had on two occasions—once in a child, once in an infant—obliterated both sigmoid sinuses at the same sitting without causing any noticeable disturbance whatever in the circulation. On the other hand, it is very common to exsect a jugular vein which at operation appears normal but which is later found to be involved in extensive partial thrombosis or which has its walls invaded by bacteria far beyond the limits determined by the naked-eye appearance. It is the safer practice to resect the jugular vein as low down in the neck as possible.

Dr. BERENS said that Dr. Richards had covered the point about the tying of the facial vein. At the last meeting of the Otological Society he had reported a case of descending phlebitis which had started in the sigmoid and travelled down to the vena cava, causing death by sepsis. He therefore made it a point to tie the jugular as low down as he dared and then exsect it, so that if there is any bacterial infection of the vein he might be

certain to get it out. It was not uncommon to operate on a lateral sinus thrombosis during a remission of the temperature. As Dr. Richards had said, the patients come in with a low temperature and are operated at once. If such cases were delayed for twenty-four hours there might be a temperature of 105° or 106°.

Dr. RICHARDS said that cases of septic sinus thrombosis with a low temperature were not sufficiently infrequent to be of particular interest. If the septic thrombosis be blocked on both torcular and cardiac sides by protective clots we expect little temperature, as the area of infection is more or less isolated from the general circulation. Within the past few weeks he had operated upon a case in which the highest temperature was under 100.6° and yet the whole external wall of the descending sinus limb had ulcerated away, leaving the inner wall of the sinus completely bare. A year ago he operated on a similar case in which the centre of the thrombus corresponding to the middle of the descending sinus limb had broken down into a purulent collection. Blocking this on both torcular and bulb sides were protective clots. The case was under observation for a week or ten days prior to operation, and the highest recorded temperature was subnormal. The patient was a woman about seventy years of age who had in addition to the sinus lesion an extensive epidural abscess.

Dr. GRUENING said that the teaching of the Halle school was to tie the jugular above the facial; here we tie it below and as far down as we can. This was his own practice and he had never seen any circulatory disturbance follow it. He had had a case of thrombosis of both lateral sinuses, where the jugular was tied low down on one side and not at all on the other, though the thrombus was removed. The patient got well. In his opinion the fear of disturbance of circulation following the tying of the jugular is unfounded.

**A case of restoration of protruding auricle by plastic operation: with photographs taken before and after.**

A. B. DUEL, M. D.

Dr. DUEL said that some of those present would remember a case he presented about six months before, in which a similar plastic operation had been done for the correction of a protruding auricle in an infant. The point of interest was that the deformity

had been corrected by the removal of an elliptical skin flap from the posterior aspect of the auricle and scalp behind the ear, and then drawing the edges together, without recourse to the removal of any of the cartilage as in the usual operation where the deformity was so great. The advantage of this method is that it obviates the danger of a possible chondritis, and the consequent sloughing of the parts, which might produce a deformity much greater than the original condition. The present case was shown as a confirmation of the possibility of correcting all such deformities without the removal of any of the cartilage. As could be seen, this boy had a most marked protrusion of the auricles, which the operation had perfectly corrected. The union on both sides was by first intention.

In response to a query as to how much skin had been removed from the auricle and how much from the adjoining region, Dr. Duel replied that at the widest point the skin was nearly an inch across. The amount to be removed was determined by grasping the skin on the posterior aspect of the auricle with a pair of rat-toothed forceps, producing a fold in the cartilage by carrying it as far back toward the hair line as seemed necessary to hold the auricle in proper position. The two places were then marked by the rat-toothed forceps, the included elliptical piece of skin removed, and the raw edges brought together by silk sutures.

**A case of persistent torticollis following mastoid operation.** PHILIP D. KERRISON, M. D.

The patient, a girl of seven years, was admitted to the Manhattan Eye and Ear Hospital on February 6th. Her previous history was negative as to the infectious diseases. Had never had aural discharge, but at various times had suffered from earache. In November last she had an attack of acute articular rheumatism. During this attack she complained of earache, which, however, subsided without rupture of the drum membrane.

History of present attack. On February 1st child suffered from pain in the right ear, which persisted during the night and prevented sleep. On the following day there was spontaneous rupture of the drum membrane and cessation of pain. On account of recurrence of pain she was admitted to the hospital on February 6th. Examination of the right ear on that date revealed the following condition: The drum membrane was

red and bulging; the bulging was particularly marked in the upper and posterior quadrant, and the postero-superior canal wall was somewhat swollen. There was considerable sensitiveness to pressure over the mastoid. A small perforation in the postero-inferior quadrant was evidently insufficient to allow free drainage. The temperature was only  $100.4^{\circ}$ .

*Treatment.*—Under somnoform anæsthesia myringotomy was performed. Examination of the pus following the incision showed both streptococci and staphylococci. The child was put to bed and the canal irrigated at regular intervals with bichlorid of mercury 1 in 4000. On February 9th, the mastoid tenderness being still marked, mastoidectomy was decided upon.

*Operation.*—The mastoid was exposed and the cortex removed in the usual way. Pus was found in the antrum and tip cells. The intermediate cells contained granulations, and the bone covering the lateral sinus was markedly necrotic. The lateral sinus was exposed over a space of  $\frac{1}{8}$  of an inch and was perfectly normal in appearance. The operation was completed in the usual way, the tip and zygomatic cells being thoroughly removed. The recovery has been uneventful except in the development of one symptom, namely, a very persistent and very distressing torticollis. This was noticeable on the third or fourth day and became progressively worse until some three or four weeks after the operation the proper dressing of the wound became a very difficult matter. In order more thoroughly to search for the cause of this symptom, it was decided at this time to place the patient under the influence of an anæsthetic. Under full ether anæsthesia the head became perfectly relaxed, falling by weight as readily to one side as the other. The wound was apparently healthy and no focus of infection was discovered. On or about April 15th, she was sent to Dr. Sayre for treatment. Dr. Sayre placed the child in a plaster jacket, and immobilized the head as nearly as possible in its normal erect position by a plaster helmet. The relief which the patient experienced from this treatment seems to have been immediate. It also seems to preclude the possibility of any permanent contraction of the muscles of the afflicted side.

*Discussion:* Dr. SAYRE said he had been very much interested in this case, as he had seen several similar cases where the position resembled that of torticollis, but where the condition causing it was quite distinct from that which produced the ordinary variety of torticollis. Torticollis, as generally understood, is a

twisting of the neck caused by the contraction of the muscles on one side of the neck ; the sterno-cleido-mastoid being usually the principal muscle involved. These cases are frequently congenital, or occur in very early childhood, and the question of etiology has been very much discussed. Several observers have noticed a hæmatoma in the sterno-mastoid before the occurrence of the torticollis, and have advanced the theory that in consequence of the injury which produced the hæmatoma, a scar is formed in the sterno-mastoid, which subsequently contracts, causing the inequality in the length of the muscles of the different sides of the neck, while others allege that some interference in nutrition prevents the growth of the muscles on one side of the neck and that in consequence the head is twisted to one side. In certain other cases of torticollis, the deformity comes quite frequently after injuries or exposures to draughts by apparently setting up a peripheral neuritis. A third class, of which the present case is a sample, are caused by inflammation of the upper cervical spine with spasm of the muscles controlling the inflamed joints, and present a distortion which resembles very closely the position of true torticollis, except that the face is usually directed somewhat downward rather than upward. The speaker regarded this case as a metastasis from the mastoid to the upper cervical spine, and had seen similar cases following tonsillitis and middle-ear inflammation without suppuration in the mastoid.

These cases of inflammation of the upper cervical vertebrae were formerly supposed to be very rare, but the speaker believes this view to be due to the failure to recognize the cases, as he had seen a large number of them since his attention had first been drawn to the peculiar symptoms present in this variety of cervical inflammation. Almost all of these patients have difficulty in fully opening the mouth. They are not willing to lie upon the back, and resist violently efforts to place them in a recumbent position, often saying that they felt as if they were going to die if placed there. He explains this by the fact that the recumbency causes pressure of the body of the first cervical vertebra against the odontoid process, and so intensifies the pain which in other regions of the spine is relieved by the recumbent position. The particulars of treatment to be applied, are rest and protection, and these were best obtained by the use of a plaster of Paris helmet applied in the position of deformity. After a few days the neck of the helmet is cut through parallel with the ground,

and the head straightened as far as possible, being retained in this position by a fresh plaster of Paris bandage; this procedure being repeated at intervals of a week or so until the deformity is corrected. The support must be maintained as long as any inflammation is present as shown by the occurrence of muscular spasm. In cases of tuberculosis, the period of rest would be about two years. In staphylococcus and streptococcus infection, the period of a few months usually is sufficient for cure. Several photographs were exhibited showing torticollis due to muscular contraction as well as to tuberculosis and acute metastatic infection.

Dr. GRUENING said that this was a very interesting question, considered from the standpoint of the orthopædist. Do the otologists also resort to orthopædic measures? These cases were not especially rare, and in his own practice he had seen this condition several times, though none of these cases had been so pronounced as in this child. These cases had occurred at a time when he did not remove the tip of the mastoid, and upon examination he found that the sterno-cleido-mastoid muscle was attached to diseased bone. All of these cases had occurred before 1890, but since that time he had made a practice of removing the tip as well as the other part of the bone, and he had not seen the condition. Of course, that did not apply to this case, for Dr. Kerrison especially mentioned that the tip had been removed, so there must be another cause for the torticollis.

**A case of perichondritis following radical operation. Deformity prevented by removal of cartilage.** By LEE M. HURD, M.D.

Dr. Hurd said he presented this case in order to show the good result following this method of treating a perichondritis, following the radical operation, rather than leaving it alone. Four weeks after operation this girl showed a swelling around the new meatus. This was treated by the application of a wet dressing for two days, but on the third day it was worse, and the swelling was then incised, going around the concha, from the antihelix to the antitragus, and a piece of cartilage a little larger than a nickel was removed. The edges of the remaining cartilage were examined to see if it was good normal tissue. Five days later a skin grafting was made, and a perfect result was obtained, excepting that there was a slight contraction of the meatus. There were very persistent granulations inside, and it

was difficult to keep them down. The perichondritis was so marked that the concha bulged out, rather than concaved.

**A patient with an acute tympano-mastoiditis. Complete opening of the mastoid. Recovery by primary union.**

By HERMAN KNAPP, M.D.

Dr. Knapp said he regretted very much that the patient had failed to appear. The case was one of acute otitis and mastoiditis. There was tenderness of the tip, but this symptom is of small value and does not always require operation on the mastoid, if time was allowed for observation. In my patient the tenderness increased, and the rise of temperature evidently showed systemic disturbance, so a complete mastoid operation was done, according to Whiting's method. Beginning with the zygomatic cells, nothing was found and nothing in the region of the antrum; going down toward the tip, which was laid bare, the superficial cells were healthy, but in the lowest medial tip-cells the pus was found. The wound was cleaned out and closed. Four or five days later there was some suppuration in the tip. The wound was reopened, and granulation tissue was found, but there did not seem to be any carious bone. It was cleaned out with a chisel and a curette. There was no further suppuration, and the patient is now in excellent condition.

A few days later there was a case with exactly the same history, excepting that the tenderness was in the middle of the mastoid, over the antrum. A complete operation was made, and pus was found in the antrum itself, but nowhere else. The wound was cleaned out and stitched. For four or five days the wound looked as if it would heal by primary union, but upon careful examination it also showed some suppuration, and had to be opened again and treated in the same way—the granulations removed, the wound cleansed thoroughly and closed; in two or three days everything was clean, and the recovery was uneventful.

In both cases the wound was reopened and packed very slightly with gauze, which was quite sufficient to bring about satisfactory healing.

These cases reiterate, what we all know, that it is not always safe to trust the cutaneous healing over a wound. It may be all right when we are sure that all carious bone has been removed; but even if we don't succeed absolutely, and leave a small portion of the mastoid, which later gives trouble, it is not very difficult to cleanse it, when all the rest is nicely healed by primary union.

In the future, when I see such cases, I shall as a rule make a complete opening, and if only a limited focus is found, I shall clean it out thoroughly, put in a tampon, and suture the rest of the incision.

*Discussion.*—Dr. BRYANT said that, apropos of the blood clot, during the past three years in all the cases he had operated upon, with whom he was free to use his own choice, he had employed the blood clot. Many of the wounds he had not closed entirely but had left a small cigarette drain in the lower corner, and in no case had the wound been reopened excepting one, where it was necessary to extend the operative field. He thought that wounds healed a great deal quicker when treated with the blood clot, but that possibly infection was better avoided by the use of the drain, combined with the blood clot. The cases where the wound was infected, after the operation, did not seem to have their convalescence delayed by not having had the wound packed, and had a much better cosmetic effect. The clot broke down readily, and the drainage was very free. These cases he did not pack, even after infection. A case operated upon five days ago, where the involvement was extensive and the dura uncovered in both fossæ during the operation, was already healed and dry, both in the meatus and the mastoid wound.

Dr. DUEL said that he had heard a great deal of discussion about the blood clot, but in many of the cases which he saw he would not dare to close the wound up, owing to the fact that, in doing a thorough operation, he frequently exposed a large area of the sinus, and frequently a portion of the dura; he had always found it impossible, when a large number of pus cells were evacuated, as in most mastoid cases, to so thoroughly clean it out that no infection was left. He could see how it might be safe to make an effort to close a wound by primary union by blood clot, where the dura was not exposed, because, if it should break down, as Dr. Knapp had said, it simply amounted to reopening a skin wound and curetting the case again.

Dr. HASKIN said that he had recently operated on a patient, with exposure of the dura, where the patient had recurrent attacks of mastoiditis since childhood, being now twenty years of age. A small mastoid process was found. The posterior wound was closed with a silkworm-gut suture, and the patient is entirely well, the wound having healed by first intention. The patient has had a furuncle in the canal, but this has not affected the

mastoid wound. She left the hospital on the fifth day, and when seen on the sixteenth day appeared perfectly well.

Dr. GRUENING said that after hearing Dr. Blake of Boston read a paper on the treatment of the mastoid wound by clot, he had tried it several times but had failed in his attempts, and was obliged to reopen the wound in almost every case, though he did have small areas in which the healing took place, but he finally concluded that the open method would be safer in every case. General surgeons sometimes use this method in connection with the long bones, and they also are obliged to reopen the wounds very frequently. To reopen a wound in a private house is a very serious matter—almost equivalent to another operation, though in a hospital it is a very simple procedure. He felt, however that it was safer not to be obliged to reopen the wound.

**A case of suppuration of the internal ear associated with chronic purulent middle-ear disease.** By J. D. RICHARDS, M. D.

This patient, a boy, was operated upon about a year and a half ago for subperiosteal abscess complicating a chronic purulent middle-ear disease. The interior of the mastoid was filled with a cholesteatomatous mass which invaded both antrum and tympanum. The external semicircular canal had lost its ivory-like cap and granulations were springing from its interior. The posterior wall of the bony canal was necrotic down to a level below the facial canal. This necessitated the complete exposure of the facial nerve from the floor of the auditory canal to its point of emergence from the inner tympanic wall. On clearing out the tympanum a bud of granulations was seen springing through an opening in the centre of the promontory, and on shoving this granulation mass aside pus exuded from the internal ear. The whole semicircular canal system was removed. Granulations were found in all the canals, but no pus. The petrous portion of the bone, which was pneumatic, was removed as far forward as the carotid artery. The internal ear, which was involved throughout, was entirely ablated; the facial nerve was exposed as far inward as the internal auditory meatus. About a quarter of an inch of the carotid artery was exposed as it lay in the carotid canal.

No pulsation of the exposed artery was to be seen. This absence of pulsation immediately suggested the importance of the carotid canal as a bumper in protecting the brain from

arterial shock. He had operated on two other cases similar to the present one, and in none of these was there any noticeable pulsation in the carotid artery as that vessel lay exposed in the carotid canal. On emerging from anæsthesia there was a slight facial paresis, but neither vertigo, vomiting, nor nystagmus. On the following day the paresis had developed into complete paralysis. On the third day the wound was dressed and it was noticed that a hemorrhage had occurred beneath the sheath of the nerve. Disturbance of equilibrium was at no time general. The facial paralysis continued for three or four months, when improvement began. At the present time it has practically disappeared.

**A case of mastoiditis with large subperiosteal abscess and epidural abscess, drum membrane normal, hearing good.** By JOHN MCCOY, M.D.

Mr. Wm. B. M——, male, age thirty-eight years, entered the N. Y. Eye and Ear Infirmary March 31, 1906, and gave the following history. About twelve weeks previous to entering the hospital he had an earache which lasted about twenty-four hours and subsided; after this he thought there might have been some moisture in the canal for a few days but was not sure. Following this he had a feeling of fulness in the ear and heard sounds of a roaring nature. About four weeks previous to entering the hospital he noticed a swelling back of the ear which was quite painful and which gradually extended up on his scalp. At the time of entering the hospital the cellular tissue over the mastoid was indurated and there was a fluctuating tumor extending from the mastoid almost to the vertex. On examination of the drum membrane it was seen to be slightly congested in its upper portion and along the long process of the malleus, otherwise the membrane appeared to be normal. The external auditory canal was also normal. He could hear the watch at fifteen inches. Temperature was  $100\frac{1}{2}^{\circ}$  F.

Operation, March 31, 1906. The usual curved incision was made over the mastoid and a posterior incision made from this extending up toward the vertex about two and a half inches. About two ounces of pus were evacuated and a perforation was found in the mastoid cortex about 3-4 inches back from the canal. The mastoid was entered from this point and was found to be thoroughly necrosed; it was removed down to the inner plate; the inner plate was found to be deficient over the sinus and

the dura over the sinus was found to contain granulation tissue and pus on its surface about a half inch below the knee of the sinus. The patient is making an uneventful recovery. No record of the micro-organism found in the history.

**A case of serous meningitis mistaken for brain abscess : operation ; recovery : presenting several interesting features.** By LINN EMERSON, M.D.

The interesting features in the case are as follows :

1. Serous meningitis being mistaken for brain abscess on account of symptoms pointing to the latter condition.
2. The recovery of the patient.
3. The marked improvement in hearing in an ear possessing a long-standing chronic catarrhal otitis media as a result of the destruction of the drum by suppuration and a mastoid operation.
4. The cure of an epilepsy of fourteen years' standing as a sequence of the operation.

The history is as follows :

Mrs. E. H., aged thirty-eight, mother of six children, five of whom are living and well. Eldest child died of diphtheria at the age of three. Father died in 1899 of apoplexy, age not stated. Mother living and well. A paternal aunt has suffered from epilepsy since the age of fourteen years. The first epileptic attack occurred June 16, 1890, four days after the birth of her third child, and patient can assign no reason for this attack. Attacks are said to have been very severe at times, and about a year preceding the present illness the patient was in the Orange Memorial Hospital and diagnosis of status epilepticus made.

She came to the Orange Memorial Hospital Dispensary November 15, 1904, with a history of left-sided acute otitis following grippe. Her family physician had performed a paracentesis of the membrana tympani, and treated the discharging ear in a proper manner for one week, but, mastoid symptoms supervening, he sent her to me for further treatment.

Patient was very deaf in both ears, had been so for several years, and heard only very loud voice. The condition of right *Mt.* indicated a chronic catarrhal process of long standing, and it is reasonable to suppose the same condition had been present on the left side.

She was at once admitted to the hospital and vigorous anti-

phlogistic measures employed, but as no amelioration of the mastoid symptoms occurred, a mastoid operation was performed November 18th, three days after admission. (15 gr. potassium bromid, t. i. d., which she was taking before admission, was continued.)

There was considerable pus and granulation tissue found, the condition being that usually found in such cases. However, just at the close of the operation, too vigorous pressure with the curette broke through the bony wall over the sinus and a wound of the sinus occurred. Hemorrhage was brisk, but easily controlled, and after slightly enlarging the opening in the bone, the sinus was packed with plain, sterile gauze.

On the day following the operation the afternoon temperature was 100° F., on the second day 102°, and on the third 101°, when the outer dressing was changed. On the fourth day it was 100.8° and on the fifth it was 99°, when the packing was removed from the sinus without any recurrence of the hemorrhage. The case now made satisfactory progress for three days, but on November 26th there was a slight afternoon rise of temperature, and on the 27th it was 102.4°, and the patient complained of headache on the side involved. On the 28th it was 103° and on the 29th 100.4°, with increase of headache and inability to sleep on account of the pain in the head. From this time forward temperature did not reach 100° at any time.

The headache grew worse, head tenderness, particularly on percussion, occurred. Left-sided optic neuritis was first observed December 1st, and made rapid progress. On December 8th divergence of the left eye occurred and became more marked on the 9th and 10th.

The patient slept very little these last few days. While she never vomited she was frequently nauseated, and anorexia was complete. As she was failing rapidly, it was evident that operation was inevitable. The progressive slowing of the pulse, which was but 50 on the morning of the 10th, was the deciding factor.

On Sunday morning, December 11th, left temporal lobe was exposed by a flap turned down, with trephine and rongeur. The dura bulged markedly, but appeared healthy. On incision several drachms of clear serous fluid escaped under considerable pressure.

The brain appeared healthy, but several deep incisions with

a narrow bistoury were made in various directions without result.

I was very much chagrined at the result of the operation until the almost miraculous improvement in the patient's condition manifested itself.

The respiration, pulse, and temperature on the second day became normal and remained so.

On the third day the wound was dressed (the outer dressings had been changed several times on account of the free flow of cerebral fluid), but the gauze drain was left for one week.

The day following the operation the patient was free from all her distressing symptoms, and was out of bed on the third day.

She made rapid progress and left the hospital January 1, 1905, three weeks after her second operation. On January 16th both wounds had closed completely, the aural discharge had ceased and she could hear ordinary conversation with her left ear.

Under date of April 24, 1906, she writes me that she still hears well, and had had no attack of epilepsy since her last operation, a period of sixteen months.

Whether she will remain free from her epileptic seizures is a matter for conjecture and further observation.

While this case is no particular credit to me as a surgeon, I feel that the many interesting points observed justify its presentation.

Dr. BRYANT showed a **salpingoscope** for the Eustachian tube. He stated that it had been of considerable use to him in the examination of patients, in forming a diagnosis, and also in observing the results of treatment, the functional action of the Eustachian tube, and the morphological conditions of the fossæ of Rosenmüller and the naso-pharyngeal structures. A view of the larynx could be obtained as well as of the upper fossæ of the nose, and it could be used for transilluminating the maxillary and frontal sinus.

## BOOK REVIEWS.

**III.—Operative Otology. Surgical Pathology and Treatment of Diseases of the Ear.** By CLARENCE JOHN BLAKE, M.D., Boston, and HENRY OTTRIDGE REIK, M.D., Baltimore. D. Appleton & Company, New York and London. 349 pages. 1906.

This is the third American book on Operative Otology which has appeared in a short space of time. In the preface it is stated that the book is "rather a record of individual experience than a review of the literature of the subject."

The book starts with a chapter on surgical anatomy, illustrated by some excellent reproductions of mastoid bones and less successful photographs of head sections. The second chapter is on surgical technique, and supplies general surgical information, presumably for the aural specialist who has had no surgical training. Then follows a description of those conditions of the auricle, auditory canal, tympanum, and mastoid process, which may require surgical intervention.

Among the indications for operating in mastoiditis, p. 177, importance is laid (6) upon finding streptococci in the aural discharge and (7) leucocytosis in the presence of mastoid symptoms. Though these conditions are of certain corroborative value, their importance must not be exaggerated, as they never can replace the classical mastoid symptoms. The mere finding of a certain bacterium can never give an indication for operation, as it is not the kind of organism, but its virulence, which is of importance, the virulence depending, as is well known, upon a number of different factors. It is now accepted that leucocytosis is not always proof of the presence of suppuration, but it is the increase in the percentage of the polynuclear form in its relation with the general leucocytosis which is of value.

The chapter on middle-ear operations brings a number of valuable features with whose development the name of one of the authors will always be associated.

Under the heading of adventitious aural surgery, the subjects of adenoids, infusions, and lumbar puncture are treated. An

appendix brings a number of articles on special subjects, partly in the form of reprints, which include "The Localizing Symptoms of Brain Abscess," by Dr. G. A. Waterman, of Boston; "The Removal of the Stapes for the Relief of Auditory Vertigo," by Dr. E. A. Crockett, of Boston; "Hearing-Tests as an Aid in Locating Tympanic Lesions" and "Surgical Exploration of the Labyrinth after the Method of Julian Bourguet."

A. K.

**IV.—Lehrbuch der Ohrenheilkunde für Aerzte und Studierende** ("Text-Book on Otology, for Physicians and Students"). By Dr. F. BEZOLD, Professor of Otology, Munich University. 346 pp. Wiesbaden, J. F. Bergmann, 1906.

The subject of Otology is presented in thirty-two lectures designed for the use of physicians and students. The author's style is clear and scientific. Three lectures are devoted to the functional examination of hearing, with an introduction on physiologic acoustics, which, coming from a master on the subject, will be read with interest and profit by many. Of operations only those are described which the general practitioner may be called upon to perform. The chapters on Diseases of the Internal Ear have been written by Professor Siebenmann, of Basel. The book contains seventy-five illustrations in the text and one plate of pictures of the drum-membrane. It is dedicated to Von Tröltsch, as founder of Otology, whose picture is given on the frontispiece. The get-up of the book is the usual excellent one of the publisher.

A. K.